

THE EFFECT OF INTERACTIVE MULTIMEDIA INTERVENTION VERSUS A
TRADITIONAL HANDBOOK METHODOLOGY ON FACULTY KNOWLEDGE OF
STUDENTS WITH DISABILITIES

By

JUDY L. WALD

A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

1995

ACKNOWLEDGEMENTS

This work is dedicated to my family. My mother, who passed away during the course of my studies, demonstrated that despite adversity and pain goals can be achieved. My father's love and confidence in me have driven me to accomplish all that is possible. My brother, the happy wanderer, proved that life has no boundaries and creativity and imagination should be encouraged and not squelched. My family has been my inspiration and support--for this, I am grateful!

I would like to thank my doctoral committee at the University of Florida: Dr. Schwartz my chair, for his wisdom, wit, and enthusiasm; Dr. Repetto, who truly demonstrates the meaning of perseverance; Dr. Reichard, whose support and experience have guided me throughout this process; Dr. Hensel, whose perspectives have heightened my curiosity to delve into new areas; and Dr. Sandeen, whose dedication and optimism are an example to us all.

I am also grateful to Ken Osfield, ADA Coordinator at the University of Florida, for his friendship and encouragement. My practicum experience in the Office of Programs and Services for Students with Disabilities early in my doctoral program sparked my interest in higher education and students with disabilities.

Finally, I would like to acknowledge all of the students with disabilities at the University of Florida whom I have met over the past three years. I have learned through our interactions and have personally benefited from our friendships. I promise to continue to strive to make this world a better place.

TABLE OF CONTENTS

	<u>page</u>
ACKNOWLEDGMENTS	ii
LIST OF TABLES	v
ABSTRACT	vii
 CHAPTERS	
1 INTRODUCTION TO THE PROBLEM	1
Statement of Problem	3
Statement of Purpose	6
Rationale of the Study	7
Definition of Terms	9
Delimitations of Study	10
Limitations of the Study	11
Summary	12
Overview of the Remaining Chapters	13
2 REVIEW OF THE LITERATURE	14
Selection of Relevant Literature	15
The Basis for Services for Students with Disabilities in Higher Education	16
Faculty Training in Higher Education Settings	21
The Campus Climate	50
Cognitive Flexibility Theory	67
Multimedia as a Pedagogical Approach	70
Summary	81
3 METHODS AND PROCEDURES	85
Introduction	85
Description of the Null Hypothesis	85
Description of the Pilot Study	87
Description of the Subjects	91
Description of the Research Instrumentation	100
Description of the Procedures	109

Treatment of the Data	112
Summary	115
4 RESULTS	120
Summary of Demographic Information	121
Experience Teaching Students with Disabilities	125
Access to Computer Hardware	129
Research Question #1	130
Research Question #2	132
Research Question #3	136
Research Question #4	139
Summary	140
5 DISCUSSION AND IMPLICATIONS	143
Review of Study Purpose and Objectives	143
Review of the Literature	144
Review of the Hypotheses	145
Review of the Methods	146
Summary of Research Findings	148
Interpretation and Discussion of Results	149
Results Associated with Cognitive Flexibility Theory	160
Problems and Limitations	161
Implications for Future Research	163
Summary	165

APPENDICES

A FEEDBACK FROM NATIONAL DISABILITY SERVICE PROVIDERS ..	167
B ORIGINAL KNOWLEDGE SURVEY	170
C PRETEST CORRESPONDENCE; DEMOGRAPHIC SURVEY; PRETEST SURVEY; THANK-YOU NOTE; POSTTEST SURVEY	172
D PANEL OF EXPERTS USED IN PILOT STUDY	178
E CONTENT VALIDITY CHECKLIST FOR TRAINING MODULES	181
F RELIABILITY CHECKLIST FOR KNOWLEDGE INSTRUMENT	184
G HOT NEWS FLYER	186
H TIME LINE AND PROCEDURES	188
I MATERIALS; DESCRIPTION OF HARDWARE	189

J	FACULTY HANDBOOK	191
K	EXAMPLE OF GRAPHICS FROM MULTIMEDIA INTERVENTION ...	206
	REFERENCES	208
	BIOGRAPHICAL SKETCH	216

LIST OF TABLES

Table 2-1.	Major Studies Related to Services for Students with Disabilities in Higher Education Settings	23
Table 3-1	Demographics of Randomly Selected 300 Faculty Members for Initial Mailing. Data Represents Actual Number of Subjects by Category and Percentage of Entire Sample	92
Table 3-2.	Demographics of Sample of Returned Surveys Deemed Usable for the Second Step of the Research Process. Numbers Indicate Actual Completed Pretest Surveys Received	97
Table 3-3.	Schematic Representation of the Experimental Design	110
Table 3-4.	Linear Model of the ANCOVA	114
Table 4-1.	Demographics of Final Sample	122
Table 4-2.	Mean Scores of Knowledge for Study Participants by Group and Gender	123
Table 4-3.	Descriptive Data for Study Participants: Experience Teaching Students with Disabilities by Group	125
Table 4-4.	Mean Scores of Knowledge for Study Participants by Previous Experience Teaching Students with Disabilities and Group	126
Table 4-5.	Results of Analysis of Variance for Knowledge by Previous Experience Teaching Students with Disabilities	127
Table 4-6.	Results of Analysis of Variance for Knowledge by Previous Experience Teaching Students with Disabilities and Group	128
Table 4-7.	Descriptive Data for Study Participants: Access to Computer Hardware by Group	129
Table 4-8.	Mean Scores of Knowledge for Study Participants by Group	130
Table 4-9.	Results of Analysis of Covariance for Knowledge of Issues Related to Students with Disabilities in Higher Education by Group	132

Table 4-10. Descriptive Data for Study Participants: Satisfaction with the Training Modality by Group	133
Table 4-11. Mean Scores of Reported Satisfaction Scores for Study Participants by Group: 1-Very Dissatisfied; 2-Dissatisfied; 3-Satisfied; 4-Very Satisfied	134
Table 4-12. Results of Analysis of Variance for Reported Satisfaction Scores for Study Participants by Group	134
Table 4-13. Descriptive Data for Study Participants: Perceptions Regarding the Future Applicability of the Modality as a Staff Development Tool by Group	136
Table 4-14. Mean Scores of Reported Perceptions by Study Participants Regarding the Training Modality as a Future Staff Development Tool by Group	137
Table 4-15. Results of Analysis of Variance for Reported Perceptions for Study Participants Regarding the Modality as a Future Staff Development Tool by Group	138
Table 4-16. Mean Scores of Reported Time Necessary to Complete the Training Modality By Study Participants	139
Table 4-17. Results of Analysis of Variance for Reported Time Necessary to Complete the Training Module for Study Participants by Group	140

Abstract of Dissertation Presented to the Graduate School
of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy

THE EFFECT OF INTERACTIVE MULTIMEDIA INTERVENTION VERSUS A
TRADITIONAL HANDBOOK METHODOLOGY ON FACULTY KNOWLEDGE OF
STUDENTS WITH DISABILITIES

By

Judy L. Wald

August 1995

Chairman: Dr. Stuart E. Schwartz
Major Department: Special Education

Faculty knowledge is important in the retention and success of students with disabilities in higher education. There is a scarcity of research related to the optimum means to disseminate disability related information. Multimedia technology is based upon cognitive flexibility theory, characterized by an interactional framework, flexibility, and authentic learning opportunities. Traditional modes of training are one-dimensional and linear and do not invite learner activity.

The effectiveness of an interactive multimedia intervention versus a traditional handbook intervention in facilitating faculty knowledge of students with disabilities was evaluated using a pretest-posttest design. The treatment entailed an interview and the completion of the multimedia intervention or the faculty handbook.

A pretest knowledge survey and demographic form were mailed to 300 randomly selected faculty at the University of Florida. The final sample of 42 subjects was

obtained from the respondents who returned the pretest and volunteered to participate in the study. Questions focused on legislation, instructional modifications, and resource information. This instrument was evaluated during the pilot phase and deemed reliable. The posttest instrument included questions regarding satisfaction with the instrument, perceptions regarding the modality as a future training tool, and efficiency of the intervention.

Analysis of covariance (ANCOVA) was used to assess the modality's impact upon knowledge levels, with the pretest as the covariate. There was no statistical significance found based upon group. In both groups, the overall mean of the knowledge scores from pretest to posttest increased. A significant difference in posttest mean knowledge scores was found based upon the covariate.

A significant difference in satisfaction ratings was evident using analysis of variance (ANOVA). The multimedia group expressed higher satisfaction ratings than the traditional group. No significant difference between the means of the two groups in perceptions of the modality as a future staff development tool or efficiency was identified.

Training is effective in enhancing faculty knowledge. Satisfaction with the modality and its impact upon motivation is a consideration for professional development planners. The importance of evaluating the effectiveness of training modalities and refining these interventions based upon the interests of learners and technological capabilities is suggested.

CHAPTER 1

INTRODUCTION TO THE PROBLEM

Students with disabilities are enrolling in postsecondary institutions at an ever increasing rate. The percentage of full time freshmen reporting disabilities rose from 2.6% in 1978 to 8.8% in 1991 ("Percent of College," 1992). This represents 140,000 students with disabilities who are among the 1.6 million freshmen attending higher educational institutions (Jarrow, 1993). Approximately 10.5% of the 12.5 million postsecondary students reported having some disability (Rothstein, 1991b).

The reasons for this sharp increase are many. Legislation such as the Rehabilitation Act of 1973, the Individuals with Disabilities Education Act of 1990, and the Americans with Disabilities Act of 1990 have impacted upon the number of students considering postsecondary education as an option subsequent to their graduation from high school. These federal mandates directly affect the services that are available to students with disabilities once they enter the college campus (Frank & Wade, 1993). Another factor that has influenced the number of students enrolling in higher education institutions is based upon the economic contributions that people with disabilities can make in the labor force (Nelson, Dodd & Smith, 1990). Without programs and services for students with disabilities in higher education settings, there is a large pool of qualified individuals who are not able to contribute to a productive labor force (Fairweather & Shaver, 1990). These individuals will not be afforded the opportunity to utilize their knowledge, skills, and abilities in productive and meaningful ways. Perhaps students with disabilities

always existed on college campuses in great numbers, and only recently has the campus climate encouraged disclosure regarding a disability (Satcher, 1992b). Regardless, there is irrefutable evidence that students with disabilities are increasing in numbers in higher education institutions.

When students with disabilities enter the postsecondary environment the administrators are expected to make reasonable accommodations for qualified individuals (Jarrow, 1991). Although controversy pertinent to these terms as defined by Section 504 of the Rehabilitation Act of 1973 continues (Frank & Wade, 1993; Jarrow, 1991; Rothstein, 1991a), the degree to which a student with a disability will benefit from postsecondary involvement is impacted by the attitudes, behavior, and knowledge of university faculty (Aksamit, Morris, & Leuenberger, 1987; Houck, Asselin, Troutman, & Arrington, 1992; Salend, Salend, & Yanok, 1985). The consideration of faculty development programs related to students with disabilities is important for optimum service delivery programs in higher education settings.

The positive correlation between exposure to knowledge about people with disabilities and subsequent attitude change is demonstrated in research endeavors (Baggitt, 1993; Fonosch & Schwab, 1981; Schoen, Uysal, & McDonald, 1987). Researchers have utilized survey research and experimental methodologies at the college and national levels to substantiate the importance of faculty training related to disability issues and services for students in higher education domains. Training intervention directed toward enhancing faculty knowledge of students with disabilities in postsecondary settings is deemed an important component of disability service programs (Farrell & Harckman, 1988; Houck et al., 1992; Leyser, 1989; Satcher, 1992b).

Administrators in institutions of higher education continuously address staff development concerns (Bradley, Kallick, & Regan, 1991). However, there is an impetus on campuses to develop innovative means of engaging faculty in training programs directed toward enhancing knowledge of issues pertinent to students with disabilities (Gajar, 1992). As program developers struggle to integrate faculty training related to students with disabilities into postsecondary domains, they must balance the academic responsibilities of the faculty with the unique instructional and interpersonal needs of students with disabilities (Vogel, 1993). The viability of innovative means to address staff development issues becomes even more realistic as resources for training programs diminish in higher education settings.

The use of multimedia and interactive technology is viewed as a viable training intervention (Day, 1993; Goldman & Barron, 1990; Merseeth & Lacey, 1993). The characteristics of multimedia as a training tool rely on the tenets of cognitive flexibility theory. The authentic learning opportunities available through hypermedia technology (Newmann & Wehlage, 1993) and its impact upon cognitive processes and transfer of learning (Jacobson & Spiro, 1993) give credence to the use of multimedia as a training vehicle. The effectiveness of multimedia as an instructional tool is evidenced in empirical investigations in a variety of settings. Considering this evidence, its application in the higher education domain as a training modality to enhance faculty knowledge of students with disabilities is realistic.

Statement of Problem

As an increasing number of students with disabilities enroll in postsecondary institutions, strategies to facilitate the retention and successful adjustment of these

students in higher education becomes even more important. A substantial body of research supports the contention that faculty training is an integral component of the success of these students in postsecondary education settings (Aksamit et al., 1987; Houck et al., 1992; Putnam, 1984; Rose, 1993). In fact, HEATH, the resource for disability issues in higher education affiliated with the American Council on Education in Washington, DC, published an information fact sheet pertinent to the importance of faculty training ("Focus on Faculty," 1987) in higher education settings. Professionals from this organization offered suggestions regarding the use of faculty handbooks, lectures, print handouts, videotapes, and awareness inservice programs. Empirical studies have resulted in further recommendations for faculty training (Aksamit et al., 1987; Baggitt, 1993; Leyser, 1989) such as workshops and listing of resources. However, in the enormity of research that has focused upon the delivery of service to students with disabilities in higher education settings, there is little attention directed toward identifying the effectiveness of training interventions. The lack of empirical evidence related to the effectiveness of traditional training modalities such as faculty handbooks, leads to questions regarding whether faculty are, in fact, receiving disability related information through the most optimum means.

The use of computers and information technology is rapidly becoming commonplace on college campuses (Schumacker & Hossain, 1990) and holds great promise as an instructional modality (Day, 1993; Peck & Dorricott, 1994). Multimedia technology represents the technological sophistication that has evolved, and incorporates hypermedia capabilities. The use of interactive multimedia is based in the learning theory tenets of cognitive flexibility theory. However, this mode of instructional

methodology, regardless of its strong theoretical foundation, cannot be deemed effective without rigorous and controlled empirical investigation. The effectiveness of multimedia as a training tool has been studied in a variety of educational domains. The technology has been implemented as a vehicle to teach seventh graders about earth science (Levin, 1991), was used as a test preparation aid (Knight, Acosta, & Anderson, 1988), and demonstrated great promise in facilitating social skill development (Bain, Houghton, Sah, & Carroll, 1992). However, the application of this technology in postsecondary settings as an instructional vehicle to enhance faculty knowledge of students with disabilities has not been the emphasis of empirical study.

Administrators in higher education settings must strive continuously to identify the most effective means of providing staff development. The use of multimedia technology may represent the most viable means of disseminating information to faculty regarding disability issues in higher education. However, without empirical evidence to substantiate its use as a training modality, the modality may simply be incorporated in the long listing of training interventions that have previously been recommended. Administrators in postsecondary settings have a responsibility to their faculty and students to engender a campus climate that promotes collegiality through communication and the dissemination of information. Lack of attention directed toward assessing the effectiveness of multimedia to enhance faculty knowledge of students with disabilities would negate the potential of innovative technology to facilitate a cohesive campus climate.

Statement of Purpose

The purpose of this research undertaking was to ascertain whether the use of interactive multimedia technology, relying on the theoretical foundation of cognitive flexibility theory, is more effective in facilitating faculty knowledge regarding students with disabilities than a traditional faculty handbook training methodology. Specifically, the multimedia training package, using the Freelance Graphics authoring software, was designed and developed to address the following questions:

1. Will the use of an interactive multimedia intervention or a traditional handbook methodology result in a significant difference in faculty knowledge of issues related to students with disabilities in higher education settings?
2. Will the use of an interactive multimedia intervention or a traditional handbook methodology result in a significant difference in faculty satisfaction with the modality as a staff development intervention?
3. Will the use of an interactive multimedia intervention or a traditional handbook methodology result in a significant difference in faculty perceptions regarding the modality as a future staff development tool?
4. Will the use of an interactive multimedia intervention or a traditional handbook methodology result in a significant difference in time necessary to complete the training module?

The posttest survey contained Likert-type questions that will provide the necessary information to address the questions posed above. Additionally, the inclusion of open-ended questions in the posttest survey served to gather more specific information regarding areas of satisfaction, and perceptions regarding future applicability. This

information, which is more subjective in nature, was used to complement the empirical data obtained through the Likert scaling system. Only through the acquisition of quantitative and qualitative information can a comprehensive assessment of the effectiveness of multimedia versus a traditional faculty handbook training intervention transpire.

Demographic information was obtained in the pretest survey and was used in conjunction with the posttest results to provide further descriptive information regarding the sample. Although the questions addressed in this research focused upon training modalities, it would be interesting to gather information regarding the nature of the sample such as gender, academic discipline, years of teaching experience, and prior experience teaching students with disabilities. Based upon the small sample size and the underrepresentation of each of these demographic groups, it was difficult to make any inferences regarding the impact of any one of these variables on the knowledge level of faculty. However, the descriptive information that this data offered enhanced understanding of the current sample. This type of information set the foundation for future empirical investigation using a larger sample that was more representative of these varying demographic categories.

Rationale of the Study

Cognitive flexibility theory provides the theoretical foundation for this investigation. Undeniably, there is a need to provide faculty with innovative means of enhancing their knowledge of issues pertinent to students with disabilities in higher education settings (Leyser, 1989). The use of interactive, multimedia technology

represents an innovative training vehicle, with cognitive flexibility theory providing the justification for its effectiveness.

Spiro and Jehng (1990) defined cognitive flexibility as, "the ability to spontaneously restructure one's knowledge, in many ways, in adaptive response to radically changing situational demands (both within and across knowledge application situations)" (p. 165). The use of multimedia for training relies on the theoretical foundation of cognitive flexibility in that information is presented in multiple dimensions using a nonlinear organization. This differs from traditional methodologies that rely upon a highly directed flow of information. Further, cognitive flexibility entails an authentic learning environment, using case studies and scenarios as representative of realistic application (Jacobson & Spiro, 1993).

Multimedia environments and the use of hypertext are consistent with the characteristics of cognitive flexibility theory that necessitate an enabling rather than directive environment (Quade, 1993). The trainee or learner is able to control the sequence of events of the training module contingent upon their acquisition of information and learning style. Learners are able to utilize the branching capabilities inherent in multimedia technology to steer their course of instruction. Larsen (1992) indicated that multimedia technology is able to adapt to the needs of the learner in contrast to traditional instructional methodologies in which material is presented in a linear fashion. In traditional training methodologies, the learner has no choice in direction of material presented and is a passive learner. In contrast, cognitive flexibility theory necessitates that the learner be actively involved in order to facilitate transfer of learning (Day, 1993; Smith, 1989; Spiro & Jehng, 1990). Interactive multimedia enables

the learner to make decisions, to move through a training module based upon individual learning preferences. The potential for simulation learning and problem-solving activities (Eisner & Carter, 1989) is inherent in the cognitive flexibility theoretical framework. The use of interactive multimedia incorporates the tenets of cognitive flexibility theory and its authentic learning component to provide a learner-directed, stimulating vehicle for training intervention. Multimedia as a training modality is an innovative means of enhancing knowledge of faculty regarding students with disabilities in higher education settings. The use of this technology is soundly based in the principles of cognitive flexibility theory.

Definition of Terms

Student with a disability (person with a disability) is defined by section 504 of the Rehabilitation Act of 1973 and is reiterated in the 1990 Americans with Disabilities Act. A person with a disability is someone with a substantial limitation in one or more major life activities. A person is considered to be a person with a disability if he/she has the disability, has a record of the disability, or is regarded as having the disability (Jarrow, 1993).

Interactive Multimedia utilizes computer software and hardware to present information to the learner in a variety of formats including text, graphics, and pictures (Lennon & Maurer, 1994).

Hypertext refers to computer-based texts that are read in a nonlinear fashion and that are organized on multiple dimensions. The same material (e.g., text, video, audio) is capable of being explored in a variety of ways, with the different exploration paths producing what are essentially multiple texts for the same topic (Spiro & Jehng, 1990).

Hypertext is a non-linear, multidimensional, semantic structure in which words are linked by associations (Tripp & Roby, 1990).

Hypermedia is a more general term than hypertext and refers to nonlinear computer learning systems in any medium (including multiple-media) (Spiro & Jehng, 1990). A learner using the hypertext materials has immediate access to text or other print information and to video or audio through external equipment (Goldman & Barron, 1990).

Delimitations of Study

There were four factors that delimit this investigation. The study was conducted on only one university campus, the University of Florida. However, the university is a public, land grant institution that employs more than 3900 faculty and affords a student the opportunity to study in a variety of academic disciplines in 15 colleges. Nevertheless, the university environment is characterized by a unique collegial culture, influenced by the administrative structure of the organization. Thus, generalization of results to other academic institutions, without modification of the training instrument to be commensurate with the factors that make that institution unique, may be questionable.

In addition, the content of the material that was utilized as the basis for the development of the multimedia training program was abstracted from sources previously utilized at the University of Florida. Much of this information, especially as it relates to resources and services, is unique to this academic venue. This same material may not be commensurate with the demographics of another institution.

The selection of the computer software and hardware for the experimental intervention was another delimiting factor. The choice of software and hardware was

based upon discussions with professionals representing the computer and information systems resources at the University of Florida. Additionally, contact with software manufacturers regarding their products enabled this investigator to make an informed decision regarding the appropriateness of specific software. Ultimately, the decision was made to utilize the PC based Freelance Graphics authoring software and a PC based laptop computer to develop the computer based training program. This decision considered the accessibility of PC based hardware to this investigator and its technological capabilities, including branching effects. Additionally, this software was easy to use by both the author of the training program and the learner using the technology as a training modality. However, the decision to use Freelance Graphics was delimiting in terms of the capabilities of the software and hardware. The PC based laptop computer used to administer the training intervention did not have the capability of sound, animation, and movies. A more sophisticated laptop computer could have the potential of incorporating more of the multidimensional components of multimedia.

The final delimiting factor emanated from the voluntary nature of participation of subjects. Faculty from the University of Florida were randomly selected and were invited to participate by way of written correspondence and personal contact by this investigator. There was no mandatory obligation to participate in this research, thus the samples for both the experimental and control groups were self-selected participants.

Limitations of the Study

The experimental and control group interventions were completed by study participants on an individual basis. Thus, there was no opportunity to monitor a subject's use of alternate materials as a supplement to the training materials during the course of

this study. Although in an introductory letter it was recommended that subjects utilize only the multimedia training or the faculty handbook training to acquire knowledge during this study, the use of supplementary learning materials by faculty subjects could not be controlled.

Summary

Faculty training pertinent to issues regarding students with disabilities in postsecondary settings is viewed as a vital component of programs and services in higher education settings. Traditional training interventions such as faculty handbooks, print materials, and inservice training are frequently recommended as the vehicle for training at the postsecondary level. However, the use of technology, specifically an interactive, multimedia format, holds promise for training intervention. Cognitive flexibility theory provides the platform for the effectiveness of a hands-on, interactive approach toward training. The authentic learning opportunities available through the presentation of case information utilizing the multimedia technology is effective in facilitating transfer of knowledge to situations outside of the training venue. Long-term learning and increased problem solving ability are the positive ramifications of the interactive technology.

However, there is a scarcity of research related to the effectiveness of training interventions. Although staff development theory provides the foundation from which training interventions can be developed, there is little empirical evidence from which modality effectiveness can be determined. This is especially true in examining training vehicles directed toward enhancing faculty knowledge of students with disabilities in higher education settings.

As more students with disabilities enter the postsecondary educational domain, the ability of faculty members to apply their knowledge of disability issues to this varying group of students becomes even more important. The students on a university campus, including those with disabilities, are eclectic, with a diverse array of learning styles and instructional needs. The ability of faculty members to respond to these unique attributes in a variety of situations should facilitate the retention of students with disabilities in the higher education domain.

Overview of the Remaining Chapters

The forthcoming chapters detail the process of development and implementation of a multimedia training intervention and address the objectives of this research. In Chapter 2, a comprehensive literature review and analysis of empirical research is presented. The literature reviewed by this investigator emphasized student service programs in higher education, staff development in postsecondary educational settings, cognitive flexibility theory, and the viability of using multimedia as a training intervention. The methodology utilized—including the hypothesis, sample selection, instrumentation, study process, and data procedures—is addressed in Chapter 3. All materials identified in this section will be contained in the appendices. The information contained in Chapter 4 is a description of the results of this research undertaking including the empirical findings of the training interventions. The final chapter, Chapter 5, contains a comprehensive summation of this research investigation and includes recommendations for further research. Included in Chapter 5 are recommendations for future training practices related to increasing faculty knowledge of students with disabilities in higher education settings.

CHAPTER 2 REVIEW OF THE LITERATURE

In order to gain a full understanding of the topic of the use multimedia as a training intervention to facilitate faculty knowledge of disability issues, a comprehensive analysis of the literature was necessary. A critical review of research and theory underlying this research is best approached using an organizational schema that depicts the varying topical areas that are affected by this investigation. The breadth of this research undertaking is exemplified by the varying subject areas addressed in a review of the literature.

Section one of this chapter addresses the issues that reflect the importance of implementing faculty training programs directed toward enhancing knowledge of students with disabilities. National and state-based empirical findings demonstrate the ongoing need for raising faculty awareness of students with disabilities in higher education settings. Second, issues regarding staff development and adult learning in postsecondary environments will provide the reader with a general theoretical framework for understanding the considerations involved in implementing faculty training programs, regardless of the topical focus. The third section of this chapter addresses the tenets of cognitive flexibility theory that support the use of multimedia as an inservice training tool. Factors such as the use of cases to facilitate problem solving, the active participation of the learner, and the ability of the learner to self-direct the course of training are important components of cognitive flexibility theory that justify the use of

multimedia as a tool in training programs. Finally, empirical evidence using multimedia and computer-based instruction will be discussed to demonstrate the relationship between the tenets of cognitive flexibility theory and the capabilities of multimedia. This section will demonstrate that although the use of authoring software, such as Freelance Graphics, may be an innovative phenomena, the underlying theoretical concepts associated with its effectiveness have its roots in cognitive theory that has been at the core of instructional design for a very long time.

This chapter is far reaching in its topical content. However, a diversity of focus is necessary to comprehensively address the issues that permeate the research question addressed in this study. The expansive nature of this chapter illustrates the breath of the subject. A restrictive review of the literature would be doing a disservice to the readers of this research and importantly, a disservice to the students who are ultimately affected by this training intervention.

Selection of Relevant Literature

Legislation impacting the provision of services for students with disabilities in higher education was not in place until the mid-1970s, when Secretary of the Department of Health, Education, and Welfare, Joseph A. Califano, signed the implementation of the Rehabilitation Act of 1973 (Putnam, 1984). Thus, the enormity of literature focusing on this topic as well as empirical investigations pertinent to specific programs did not evolve until the 1980s. The literature reviewed in this section reflects this time frame and reflects the underlying philosophical impetus associated with the movement of students with disabilities into postsecondary educational settings.

In order to comprehensively review the literature pertinent to services for students with disabilities in higher education, staff development, cognitive theory, and the use of multimedia, data based resources were used including Dissertation Abstracts International, Educational Resources Information Clearinghouse (ERIC), and Resources in Education (RIE). Additionally, the expertise of professionals affiliated with HEATH, the Washington, DC-based national organization on postsecondary education for individuals with disabilities as well as the Association of Higher Education and Disability (AHEAD) were valuable in providing additional resource information. Further, contact with disability service providers affiliated with public and private higher education institutions around the country served as an additional source of useful information. These professionals expressed that there was a need for faculty training in higher education settings and innovative means to present this information were warranted. Appendix A contains a list of service providers contacted along with their comments regarding faculty training in higher education settings.

The Basis for Services for Students with Disabilities in Higher Education

The necessity for programs in postsecondary education settings for students with disabilities is facilitated by statistical, legislative, and economic considerations. University professionals are faced with legal mandates to serve students with disabilities, a shrinking student pool from which to recruit, and an increase in the number of students identified with disabilities on their campuses (Satcher, 1992a). Consequently, college administrators must implement programs and services that enhance the success of students with disabilities on their campuses (Rose, 1993; Satcher, 1992a). These programs must be broad in their approach and should encompass faculty training

programs designed to increase knowledge and awareness of students with disabilities in higher education settings (Gajar, 1992). Despite the strides that have been made regarding programs for students with disabilities in higher education settings, the challenge remains regarding how to gain the acceptance and cooperation of university faculty (Morris, Leuenberger, & Aksamit, 1987).

There is statistical evidence that the number of students choosing higher education as a postsecondary option is increasing. In 1978, the percentage of full-time college freshmen reporting a disability was 2.6%. This figure rose to 7.0% in 1988, and to 8.8% in 1991 ("Percent of College," 1992). This represents 140,000 students with disabilities who are among the 1.6 million freshmen attending higher educational institutions. In considering the entire population of students enrolled in colleges and universities as of the fall of 1986, 10.5% of the nation's 12.5 million post secondary students were reported to have some disability (Rothstein, 1991b).

One of the reasons for this large increase in the number of students with disabilities choosing postsecondary education is legislation at the secondary school level that mandates the provision of a wide range of services and requires the incorporation of postsecondary goals into student educational plans. The transition component of the Individuals with Disabilities Education Act (IDEA) mandates that postsecondary goals be included in the student's individual education plan by the time the student reaches the age of 16 (DeStefano & Wermuth, 1992). Students with disabilities graduating from schools under IDEA, previously known as the Education for All Handicapped Children Act, have higher expectations for service (Rothstein, 1991b). School personnel are

mandated to consider postsecondary education as a viable outcome in the development of individual education plans.

Legislation in the form of the Rehabilitation Act of 1973 and the 1990 Americans with Disabilities Act is the second legislative impetus for the provision of services for students with disabilities in higher education settings. Before 1990, the legal mandate for non-discrimination in public, postsecondary education settings came from Section 504 of the Rehabilitation Act of 1973. This legislation prohibits recipients of federal money from discriminating on the basis of handicap (Gajar, Goodman, & McAfee, 1993; Marion & Iovacchini, 1983; Rothstein, 1991a; Vogel, 1982). Although the Rehabilitation Act of 1973 protects only those students who are deemed qualified to meet academic and other essential program requirements, colleges are expected to make reasonable accommodations for students with disabilities to facilitate access to services. The focus of such services is to afford students with disabilities equal opportunity to obtain comparable achievement levels as their peers without disabilities (Frank & Wade, 1993). Some of the services implemented to address the reasonable accommodations mandate include text-tape reading programs and student counseling services (Dalke, 1991).

The right to pursue a higher education degree by students with disabilities is ensured through the recently enacted Americans with Disabilities Act (ADA). The ADA extends anti-discrimination provisions to all public and private colleges regardless of whether the institution is a recipient of federal funds (Frank & Wade, 1993). Most of the terms and definitions contained in the ADA were extracted directly from Section 504 of the Rehabilitation Act, thus the recent legislation is not expected to affect many changes

in public higher education institutions (Rothstein, 1991b). However, the ADA has heightened the awareness of students with disabilities regarding their legal rights and gives them a litigation platform from which to file complaints and grievances (Shea, 1994). An institution of higher education's non-compliance with the provisions of the ADA could result in significant financial liability, costly litigation, loss of public image, and importantly, loss of the valuable contributions that individuals with disabilities can make in the postsecondary academic environment (Rothstein, 1991a). The increase in awareness as a result of the ADA will require participation and cooperation (Kroeger & Schuck, 1993) by many campus entities including faculty. The campus setting should be characterized by an environment in which students, faculty, and disability service personnel work together to identify effective accommodations that give students their legal right to academic access (Rose, 1993) and ensure a collegial environment that supports the academic endeavors of all students through communication and cooperation. At the same time, these policies should be attentive toward maintaining the academic integrity of the college curriculum. Faculty should never be expected to dilute the academic standards of curricula, instead, flexibility in making adaptations should be the underlying premise supporting reasonable accommodations ("Focus on Faculty," 1987).

To lose this pool of potential applicants for higher education settings would represent an economic hardship for colleges and universities. If programs were established in higher education settings, universities could attract more students. An increase in the number of students results in an increase in tuition dollars for an institution. With services, the campus could become known as a "welcoming place for the disabled" (Jaschik, 1994, p. A39). Completion of college and other postsecondary

vocational programs is positively related to obtaining employment and success in adult life for all individuals (Fairweather & Shaver, 1990). Monetary contributions through taxable income that working individuals can make toward the economic prosperity of our nation is important. The ability of persons who are employed to contribute to the revenue of our country instead of receiving fiscal benefits is of great economic concern. Education in a postsecondary setting as the means to achieve greater economic stability can impact upon the economic well being of our country.

The large number of students with disabilities seeking postsecondary education as well as the legislative and economic issues surrounding service provision necessitate that faculty be included in decision making and program development. Although there is empirical evidence that students with disabilities are enrolling in postsecondary education settings at an increasing rate (Dalke, 1991; Gajar et al., 1993; Nelson et al., 1990; Shea, 1994), there is evidence that suggests that these students are having difficulty staying in and graduating from colleges and universities (Bursuck & Rose, 1992). This may also be true for students without disabilities in higher education settings (Dalke, 1993). A means to address this issue is acknowledgment that faculty are integral to the admission and retention of all students in postsecondary environments including students with disabilities (Satcher, 1992a) and impact upon the adjustment of students with disabilities once they enter the college campus. Consequently, it is important that programs be in place to facilitate awareness by faculty regarding the rights and needs of all students with disabilities in the higher education domain (Satcher, 1992a). It is suggested that a comprehensive educational program related to disability issues be included in a university's response to the increasing number of students with disabilities

entering its campus (Rothstein, 1991b). Rothstein (1991b) recommended that the educational program include the implementation of a "dog and pony show" (p.480), combined with booklets containing information regarding policy, the limitations associated with certain disabilities, and ideas related to reasonable accommodations. A dog and pony show was described as a quick, one-time workshop directed toward disability issues on campus. Typically, faculty are mandated to attend such training and little effort is made to gather feedback regarding the program's effectiveness.

Empirical research, predominantly in the form of qualitative inquiry, supports the implementation of faculty training programs in higher education domains. Specific studies focus upon the kinds of training interventions that are available in postsecondary settings and draw conclusions related to training modalities that are effective in enhancing faculty knowledge of issues related to students with disabilities in postsecondary educational settings. A critical review of this empirical research will further justify the continued need for faculty development programs and gives credence to the use of innovative tools, such as multimedia technology, to carry out training objectives.

Faculty Training in Higher Education Settings

This section provides the theoretical and empirical justification for faculty training related to students with disabilities in postsecondary settings. A review of the literature pertinent to general staff development issues in higher education environments is important to initially establish the framework for the implementation of specific programs directed toward enhancing knowledge of disability issues. Second, the specific attributes associated with the implementation of disability related faculty training

programs are described using empirical study to complement the theoretical discussion. The third component of this section addresses the relationship between the acquisition of knowledge and the development of attitudes, which is either supported or refuted in empirical investigation. A discussion of this topic further delineates the importance of training programs directed toward disability issues in higher education settings. Finally, a critical review of national and college-based studies demonstrates the pervasive evidence available that supports the contention that faculty training related to students with disabilities is a critical component of disability service programs in postsecondary environments. A description of the major studies examined in this section is depicted in Table 2-1.

Staff Development in Higher Education

Training refers to a set of goals and experiences that focus upon a specific educational construct (Delworth & Yarris, 1978). Ultimately, it is expected that faculty members will increase their competency related to certain roles and tasks. The increased competency experienced by organizational members will facilitate a sense of empowerment and self-worth, two critical elements that characterize a good work environment (Morgan & Weckmueller, 1991). It is the expectation that staff development will prepare educators to provide the best possible work environment for student learning (Bradley, Kallick, & Regan, 1991). Harris (1989) purported that inservice efforts are grounded in the ideology that all personnel can improve their performance, that people are at the core of the organization, and that organizational effectiveness can be enhanced through staff development activities.

TABLE 2-1. MAJOR STUDIES RELATED TO SERVICES FOR STUDENTS WITH DISABILITIES IN HIGHER EDUCATION SETTINGS

Author(s)	Procedures/Disability focus	Sample / Question	Results	Recommendations
Aksami, Morris, & Leuenberger (1987)	- developed questionnaire - 22 items, 11 to assess attitudes; 11 to assess knowledge - independent variables- group (student services or faculty) and demographics (sex, previous info, previous contact, yrs of experience) - dependent variables - attitude and knowledge subcales - ANOVA test - learning disabilities	- student services personnel and faculty at a mid-western land grant university - enrollment: 22,000 - n=717 faculty - response rate 53% - n=51 student service personnel- response rate 60% - What are the self-reported attitudes and knowledge of student service personnel and faculty concerning LD students? Do variables such as sex, previous contact, presence of info, and years of job experience impact upon attitudes and knowledge? Are there patterns that provide direction for staff development?	- mean of 45.92 of 66 points suggests generally positive attitudes - mean of 35.79 of 66 points suggests only limited knowledge - student service personnel have significantly more positive attitudes and better knowledge than faculty - females had more positive attitudes than males - previous contact led to more positive attitudes - presence of information led to significantly more positive attitudes and greater knowledge - low findings regarding where to refer LD students, identification, when to assist and how to assist students	- use the positive attitudes reflected in this study as a foundation for developing training designed to increase knowledge about LD students - staff development training should focus on the dissemination of appropriate information, thereby positively affecting attitudes and knowledge - staff development should focus on specific characteristics of LD, the ways that LD affects academic performance, the availability of campus resources, and alternatives for presentation of class material - additional research on other campuses

Table 2-1--continued.

Author(s)	Procedures/Disability focus	Sample / Question	Results	Recommendations
Baggett (1993)	- doctoral dissertation - used mail survey to assess relationship between faculty knowledge of disabilities, experience with educating students with disabilities, and the attitudes they possess - focused on all disabilities	429 out of 1,149 faculty at the University of Massachusetts - Amherst - 32.6% response rate - What is the relationship between faculty member's knowledge of students with disabilities, experience with teaching these students and the attitudes they possess?	- respondents were unfamiliar with disabilities, service providers, and disability laws - faculty have had limited experience in teaching students with disabilities - respondents are most familiar with students with learning disabilities 50-75% of faculty surveyed were unfamiliar with services at Amherst - female respondents had more favorable attitudes toward students with disabilities than males - faculty are supportive of making educational accommodations for students with disabilities	- multimodal approach should be employed to increase awareness of disability, train colleague advocate within each department; introduce faculty concerns to students with disabilities - roundtable discussions during faculty meetings; creation of email bulletin board for disability related information; graduate students to provide in service; articles in student newspapers; creating and distributing a faculty handbook on disability; ADA workshop; create campus committee on disability

Table 2-1 --continued.

Author(s)	Procedures/Disability focus	Sample / Question	Results	Recommendations
Edwards (1992)	doctoral dissertation using questionnaire to assess critical incidents reported by college students with learning disabilities	74 college students attending 13 universities - What are the specific categories of critical incidents affecting success as reported by college students with learning disabilities	187 incidents inductively placed into four major categories: direct assistance from others, accommodations for the LD, attitudes toward the LD individual, incidents not directly attributed to action by others - highest concentration was in accommodations category	- need to educate faculty, students, and support providers regarding appropriate methods of assistance and accommodations - need to educate regarding attitudes - need for early diagnosis of LD - need to teach students strategies to heighten independence - need for trained personnel in higher education setting to serve as advocate and strategist
Houck, Asselin, & Troutman, & Arrington (1992)	- telephone survey 3 scripted questionnaires - one for faculty, non disabled students and students with disabilities	109 out of 117 faculty from a land-grant university - 93% response rate 194 out of 206 non disabled students - 94% response rate 46 students with learning disabilities - What are the perceptions of faculty and students concerning university policy and programs for learning disabled students?	- descriptive data indicated that faculty want more information regarding LD issues including support services - students perceived professors as being sensitive toward their special needs	- research is needed regarding choice of majors by LD students and faculty perceptions regarding academic success - research regarding perceptual differences related to instructional modifications - need for efforts to generate increased faculty and student awareness and sensitivity to the needs of students with LD

Table 2-1 --continued.

Author(s)	Procedures/Disability focus	Sample / Question	Results	Recommendations
Leyser (1989)	- on-site survey - all disabilities	- sample 124 full-time faculty in education and health disciplines at a large state university - represents a 56% response rate - Do faculty participate in staff development? What is faculty knowledge of laws? Degree to which info re; disabled issues is infused in curriculum? What are attitudes of faculty regarding integration and accommodation?	97% indicated knowledge of mainstreaming 87% indicated knowledge of legislation 50% participated in training: workshops, Special Arts Festival 87% infuse disability issues in curriculum 90% had experience with teaching students with disabilities 90% had positive attitude toward students with visual and hearing impairments in class 50% positive attitude toward LD students 70% had made accommodations: signers, text tape, modifying tests 30% needed support to make accommodations 80% indicated they were familiar with campus resources <50% had utilized these services -- correlation between knowledge of resources and their use was significant: $r = .456$	- continued need to identify and provide innovative alternatives for faculty participation in activities that offer information about disabilities - continue to encourage students to talk about accommodation needs with faculty
			Open ended questions: faculty stressed need for better dissemination of information, need for in	

Table 2-1--continued.

Author(s)	Procedures/Disability focus	Sample / Question	Results	Recommendations
Marion & Iovacchini (1983)	• mail survey questionnaire • all disabilities	• sent to 408 universities nationally • 155 responded - 38% response rate • What are the efforts being made by higher education institutions regarding the provision of services to students with disabilities in postsecondary settings?	• 100% of respondents had seen 504 officer • 63% had institutional committee • compliance officers spent most time on 504 issues at public universities - community colleges were highly responsive to 504 issues.	
McAfee & Sheeler (1987)	• mail survey questionnaire • mental retardation	• 200 community colleges from all 50 States - 68% valid response rate • What kind of services are available to students with disabilities?	• Services rendered: counseling, tutoring, adult basic education • 39% offered faculty training- n=53 • modes: in service-n=33; written material n=5; courses - n=1	• (identified in discussion section) • master plan to serve mr in colleges needed • increased training for faculty at all colleges

Table 2-1--continued.

Author(s)	Procedures/Disability focus	Sample / Question	Results	Recommendations
McCarthy & Campbell (1993)	- mail survey questionnaire - all disabilities	- faculty and staff at land-grant research university n=306 28% response rate - What is the most efficient method for providing resources and information to faculty working with disabled students?	79% supported communication by the disabled student services office to faculty and staff about a student's disability 50% expressed willingness to attend special interest sessions 31% undecided about attending When presented with specific training options faculty responded: 36% willingness to attend workshop 46% supported information exchange 58% supported reference material 82% access to professional resource - conflict between time needed to do research and time required for in service training - faculty are not recognized for time devoted to students with special needs	- ongoing evaluation of methods used to deliver information and services regarding students with disabilities - information should be presented that recognizes that students with disabilities are students first and disabled second - facilitate positive interactions

Table 2-1--continued.

Author(s)	Procedures/Disability focus	Sample / Question	Results	Recommendations
Morris, Leuenberger & Aksarmit (1987)	• pretest-posttest control group experimental design • experimental group received in service training • survey instrument measured knowledge / attitudes of faculty toward LD college students • Learning disabilities	• 54 of 80 randomly selected faculty members at a mid-western university • Does participation in specific faculty in service training influence college faculty members' attitudes toward, and knowledge about, student with learning disabilities?	• used ANOVA analysis • found significant relationship between faculty attitudes towards and knowledge about learning disabilities and the in service activities delivered over a 9 month time span. • in service training is effective for increasing faculty knowledge about learning disabilities • without in service training, faculty attitudes become significantly less positive • multiple in service contacts over time are necessary to have an impact on faculty attitudes and knowledge	• continued in service training over time • investigations that control for the type of in service training implemented
Nelson & Lignugaris/Kraft (1989)	• literary meta-analysis of literature focusing upon disability service programs • focus on LD programs	• identified 31 articles: 14 were surveys of services, 17 were discussion papers • What are existing services offered to LD students and where do future needs reside?	• majority indicated that counseling services, instructional accommodations, and administrative accommodations were provided • no discussion regarding how faculty development programs influence service delivery • mission of college is reflected in service delivery • little research on effective service components	• research needed to identify LD • descriptive research needed to examine service components • need to examine service components and their relation to student success • need for longitudinal studies

Table 2-1--continued.

Author(s)	Procedures/Disability focus	Sample / Question	Results	Recommendations
Nelson, Dodd, & Smith (1990)	23 item questionnaire to assess faculty willingness to provide classroom accommodations to students with learning disabilities	107 out of 141 teaching faculty at a northwestern college - 75.8% response rate - Are there differences among academic divisions in faculty willingness to provide students with learning disabilities instructional accommodations in traditional 4-year institutions?	- College of Education faculty more willing to provide accommodations than faculty at Business and Arts and Sciences - faculty indicated that they would be interested in learning new methods to help them meet the needs of students with LD	- need to replicate study on a national basis - need to assess types of accommodations that will help students with LD while still maintaining academic excellence - need to provide coordinated services to students with LD to facilitate their success - need for college administrators to provide faculty training regarding the capabilities and special needs of students with LD
Satcher (1992b)	- self-developed mailed survey instrument - learning disabilities	93 randomly selected community college faculty in Mississippi - represents a 37% response rate - What is the self-reported comfort level of community college faculty with providing a variety of accommodations to students with learning disabilities?	73% had taught student identified with a LD 98% had taught students they suspected as having learning disabilities - instructors felt most comfortable with: allowing student to tape record lectures, using note takers, allowing additional time on exams, and allowing use of dictionaries - felt most uncomfortable with giving partial credit for wrong answers, allowing misspellings and incorrect grammar	- need for ongoing support of instructors as they strive to meet the individual needs of their students - community college administrators can help clarify role of college in serving LD - Steps: review existing policies, plan, implement, and evaluate faculty development programs to enhance faculty awareness and understanding of learning disabilities and the needs of student who have LD - staff development programs would show the college's commitment to serving students with LD

Table 2-1--continued.

Author(s)	Procedures/Disability focus	Sample / Question	Results	Recommendations
Schoen, Uysal & McDonald (1987)	- Attitude Toward Treatment of Disabled Students Scale (ATTDS) - all disabilities	270 faculty members at Clemson University represents a 39% response rate - What are faculty members attitudes toward the treatment of students with disabilities?	53% taught or were currently teaching students with disabilities - faculty members held a generally positive attitude Mean = 114.7 out of possible high of 160; faculty in disciplines of education, liberal arts, architecture - highest mean scores; faculty in science, engineering, and commerce and industry had lowest mean scores - no significant differences between gender	

Table 2-1--continued.

Author(s)	Procedures/Disability focus	Sample / Question	Results	Recommendations
Smith & Nelson (1993)	• ethnographic open-ended interviews • all disabilities	• 36 college students with disabilities at a Northwestern university • What are the factors that college students with disabilities consider important to their academic success?	• Personal belief factors cited as important: discipline and effort, acceptance of their disability, personal ambition, self-confidence, prior knowledge and experience, and ability. • Social support/campus climate factors cited as important: family support, interaction with other students, interaction with faculty, and university support services • 30% indicated that faculty were supportive. Developing a professional relationship, being encouraged by, and/or receiving feedback and information from faculty was important to their academic success • 5 out of the 36 indicated that faculty were willing to make accommodations for them	• develop faculty awareness programs to enlighten faculty on how to interact and work with students with disabilities • provide instruction on how to implement instructional and institutional accommodations

Table 2-1--continued.

Author(s)	Procedures/Disability focus	Sample / Question	Results	Recommendations
West, Kregel, Getzel, Zhu, Ipsen, & Martin (1993)	- four part self-developed questionnaire: Part I - demographic information, Part II requested students to indicate accommodations they had received; Part III - Likert scale - students requested to indicate their satisfaction with their institution's efforts related to accommodations and services; Part IV - five open-ended questions related to barriers, observed improvement in services, suggested changes in programs, participation of students in policy, express concerns - analyses was completed with frequency tables and chi-square statistics	761 student with disabilities enrolled in institutions of higher education, both public and private, in Virginia - 30.4% response rate - What are the satisfaction levels of college students with disabilities regarding accessibility, special services? What are their opinions regarding barriers, and improvements in services?	>50% indicated that they were satisfied with services 60% indicated that they were satisfied with the availability of special equipment and classroom modifications 73% satisfied with requests for services 86% indicated that they had encountered barriers to their education because of their disabilities -- most frequently mentioned barrier was the lack of understanding and cooperation from class instructors, professors, and other school personnel regarding accommodations 75% of the students offered suggestions - most focused upon increasing awareness and funding of services; education of faculty; improving consistency and availability of services	- develop creative means of publicizing the rights of students with disabilities, advertising disability-related services, and promoting self-advocacy - pre-admission counseling - colleges and universities should take a stronger role in educating course instructors regarding disabilities and students' entitlement to course modifications/accommodations - special education faculty can take leadership role - support groups and clubs for students with disabilities
Woods, Sedlacek, Boyer (1990)	- mail survey - questionnaire learning disability	- Thirteen of 18 state universities that offer comprehensive services for students with learning disabilities - What kind of services are available to students with disabilities?	- LD services offered: priority registration, test/quiz administration, reader service, tutoring, testing accommodations, counseling - ambiguity regarding assessment/identification - no identification of faculty training programs at institutions	- further professional training for faculty and staff - implement quality assessment procedures - integration of campus resources - use counseling/peer support

Staff development interventions lead to adult intellectual growth and enhancement of reasoning ability (Bradley et al., 1991). The adult learner is capable of increased higher-order thinking that is facilitated by an appropriate interaction with the environment. A responsive learning atmosphere is vital to promote adult development (Bradley et al., 1991). The tenets of cognitive flexibility theory are at the heart of the adult as a viable learner and will be discussed in the forthcoming sections of this chapter. The overall mission of staff development is rooted in the belief that adults learn best when they have real experiences, careful and continuous guided reflection, continuity and reinforcement, challenge, and support (Bradley et al., 1991).

To realize staff development effectiveness, a systematic strategy is necessary, including an established set of guiding principles. Harris (1989) suggested the following guidelines:

1. Clients served: all personnel within a target organization should be provided with opportunities for inservice education. All should have the right to refuse to participate.
2. Timing: time frames should be established that allow for continuity of training experiences.
3. Involvement: participants should have the opportunity to serve as planners, and designers.
4. Locale for training: cost/benefit ratios rather than simple cost figures should be used to justify location of training.
5. Resources: training materials should be shared and ongoing funds for inservice education should be allocated.

6. Locus of control: all involved should serve as decision makers.
7. Scope of planning: staff development interventions should be part of long-term strategic plans.
8. Systematicness of planning: program should be continuously evaluated and refined.
9. Design for learning: the design of the activity should provide for differential experiences and designed to assure meaningful, and purposeful experiences.
10. Content of learning: objectives should be consistent with organizational and individual needs.
11. Incentives for participation: eliminate negative incentives.
12. Leadership: responsibility for staff development activities should be clearly delineated.
13. Evaluation: planned, systematic evaluation efforts should be part of the training program.
14. Policies: organizational policies should be reflected in staff development activities.
15. System relationships: the staff development program should be consistent with other organizational systems.

With a clear understanding of the importance of training in the higher education setting, and the incorporation of guiding principles in service delivery, the question resides in selecting the best training methodology "without reinventing the wheel" (Barr, 1978, p.37). The training modality selected must reflect the goals and objectives of the

staff development program and should be consistent with the educational resources available.

Staff Development Related to Students with Disabilities

The components of effective programs and services for students with disabilities in postsecondary settings include; personnel, referral, assessment and identification, service delivery, and evaluation of service (Gajar, 1992). Dalke (1991) indicated that all aspects of a higher educational institution's operation must be evaluated to ensure equivalent access for students with disabilities, including "recruitment, admissions, registration, academic requirements, course examinations, housing accommodations, classroom accommodations, building and classroom accessibility, financial aid, employment, physical education activities, athletic events, career counseling, and transportation" (p. 3). As evidenced by this listing, disability service programs affect every aspect of the higher educational environment.

Within the service delivery component as described by Gajar (1992), faculty training programs are considered an essential element of effective service delivery systems for students with disabilities in higher education (Schuck & Kroeger, 1993). The importance of faculty training is also evident in the parameters described by Dalke (1991) that must be considered by university personnel. Additionally, students who are successful in postsecondary education often attribute their success to the behavior of their professors (Edwards, 1992; "Focus on Faculty," 1987; Kincer, 1991). Dissemination of information to faculty regarding the needs of the students with disabilities in the postsecondary setting is therefore integral to the development and successful implementation of services for students with disabilities in higher education domains

(Gajar, 1992). Far reaching faculty and administrative support of disability service programs cannot be expected to permeate the educational domain in an environment characterized by ignorance and misinformation (Vogel, 1982). Referring specifically to college students with learning disabilities, a disability service coordinator at New York University reported, "If professors are given information about learning disabilities and are not operating in the dark, they are cooperative" (Shea, 1994, p. A55).

In 1990, Norlander, Shaw, and McGuire identified specific competencies required by disability service personnel, including instructors. However, it was acknowledged that there were no avenues for staff to obtain these competencies. Faculty training can be the vehicle to facilitate the development of knowledge, skills, and competencies. Ultimately, the acquisition of these competencies will enhance the success rate of students with disabilities in postsecondary settings.

The goals of faculty development relate to

1. facilitating understanding regarding the rationale for support services for students with disabilities,
2. gaining an understanding of specific disability groups and the implications of these disabilities on functional capabilities in the classroom,
3. learning effective strategies to encourage positive communication between students and faculty,
4. understanding the university's commitment toward access for students with disabilities in all campus operations, and
5. learning what services are available that can enhance the campus environment for faculty and students with disabilities. (Dalke, 1991)

Researchers have recommended that special education personnel should be involved in the development and ongoing administration of programs in higher education settings (Salend et al., 1985; Shaw & Norlander, 1986; West et al., 1993). It is suggested that the expertise possessed by special education and rehabilitation personnel is consistent with the knowledge base recommended to implement postsecondary programs (Salend et al., 1985; Shaw & Norlander, 1986) and should be used in leadership positions for program development.

Rose (1993) postulated that there are four questions that faculty typically ask when working with students with disabilities: "What are learning disabilities?" "What are my responsibilities under the law?" "What can I do for these students in the classroom?" and "Do reasonable accommodations mean lower standards for students with learning disabilities?" (p. 135). Although the researchers directed these questions toward the specific disability group of students with learning disabilities, these same questions can be posed by faculty when referencing any disability group. The researchers suggested that the target of staff development programs address these questions, although they cautioned that this content is not exhaustive of the information that should be shared with faculty during inservice training.

Knowledge and Attitudes

Attitudes and values shape the way professionals behave in work situations (Bradley et al., 1991). Faculty members can perform a significant role in making the collegiate experience successful (Salend et al., 1985; Walker, 1980) for students with disabilities. However, their ability to perform this role is impacted by the attitudes that they possess toward students with disabilities. The impetus for the provision of services for students with disabilities in higher education through legislative initiatives has positively affected the physical barriers that exist on college campuses. However, there

has been less impetus for the development of programs for students with disabilities in higher education settings that address the attitudinal barriers that permeate the setting (Schoen et al., 1987). Professionals from HEATH, the national clearinghouse on postsecondary education for individuals with disabilities, indicated that attitudinal barriers toward access are often more difficult to remove than physical ones, thus they pose a greater obstacle for service providers ("Focus on Faculty," 1987).

Walker (1980) described a continuum of attitudes that can be presented by faculty toward students with disabilities in higher education domains. At the negative end of the continuum is the rejecter, a faculty member who judges the student with a disability as being unacceptable for postsecondary education. Moving toward the positive is the second type of attitude that can be exhibited, that of mothering. Mothering can be defined as a fictional acceptance of the student with a disability, at times lowering the standards of academic achievement in order for students with disabilities to be successful. In the middle of the attitude continuum is the surprised ones, or novices. The responses toward students with disabilities presented by faculty in this phase are often tentative, indicating an openness toward students, yet exhibiting a sense of helplessness when it comes to accommodations or student needs. At the extreme positive side of the continuum are the wise ones. Those faculty who have had positive experiences with students with disabilities and are innovators in implementing accommodations.

Information regarding the array of attitudes that can be presented by faculty and the expectations for behavior that develop as a result of these attitudes is important for the development of effective training programs. With an understanding of these attitude formations and their behavioral implications, program developers can gear training content toward eradicating some of these negative attitudes (Walker, 1980). This can be achieved through the presentation of factual information.

A model of systematic intervention to facilitate attitude change was purported by Eichinger, Rizzo, and Sirotnik (1991). Researchers tested the effectiveness of the paradigm through the use of a pretest-posttest control group experimental design. The total sample consisted of 102 college-aged students enrolled in education classes. Approximately half of the students were included in the experimental group, which received an intervention consisting of information (readings, lectures, class discussions), contact (site visits, guest speakers with disabilities), and persuasive messages (media, position paper, readings, lecture). The control group received disability-related information in an eight-week class through the presentation of lecture material. A pretest-posttest consisted of the administration of the paper-and-pencil survey, the Attitude Toward Disabled Persons Scale (ATDP) developed to measure attitudes toward people with disabilities across disability groups.

Analysis of variance indicated that the experimental group had significantly greater improvement in attitudes than the control group ($F(1, 100) = 10.34, p < .01$). The researchers concluded that the experimental intervention incorporating the systematic attitude change procedures described above had a positive effect upon the attitudes of students. Through statistical analyses, researchers purported that the presentation of knowledge and information regarding disability issues in a systematic manner can positively influence attitudes regarding persons with disabilities.

However, the study conducted by Eichenger et al. (1991) is limited in two major ways. The samples utilized were volunteers from classes in education who had been assembled prior to the start of the study. These samples were not selected randomly, thus the ability to generalize the results outside of the specific research venue is questionable.

Second, the study used the ATDP scale as the pretest-posttest measure to assess attitudes. Although researchers conducted reliability checks (Cronbach's Alpha coefficient of .76 pretest, and .79 posttest), there is still some debate regarding the viability of this instrument to measure attitudes (Schoen et al., 1987). The Cronbach's Alpha measure is an internal consistency measure of items in the survey instrument. This analysis does not offer evidence regarding content or construct validity, namely, that the instrument truly measures the construct of attitudes that is the objective of research of this nature.

There have been attempts to measure attitudes expressed by university faculty (Anna, 1989; Baggitt, 1993; Fonosch & Schwab, 1981; Schoen et al., 1987). Researchers utilized the Attitude Toward Treatment of Disabled Students (ATTDS) scale to determine the attitudes of faculty toward the treatment of disabled students on classroom management issues pertaining to regulations in Section 504 of the Rehabilitation Act of 1973. This scale was a modified version of the ATDP scale originally developed by Yuker, Block, and Young in 1970. In order to test the reliability of the ATTDS scale, a Cronbach's Alpha coefficient was calculated. This analysis yielded a value of .88. Content validity was established using a panel of 30 experts knowledgeable regarding legislative issues (Fonosch & Schwab, 1981).

Fonosch and Schwab (1981) utilized subjects from two midwestern public universities. In contrast, the study completed by Schoen et al. (1987) was conducted at the nine colleges affiliated with Clemson University. Both research endeavors used a survey methodology (ATTDS scale) to obtain feedback from faculty members regarding their attitudes toward students with disabilities on their campuses. The majority of

subjects in both studies were males between the ages of 31 and 50. Researchers utilized descriptive statistics, analyses of variance, and chi-square analyses to identify significant differences in survey responses by faculty. Findings indicated that faculty held a positive attitude toward the treatment of disabled students. Determinants of positive attitude were found to be the specific academic area in which the faculty taught and whether the faculty member had previously taught students with disabilities. Researchers concluded that those faculty in the disciplines of education, social sciences, liberal arts, and architecture exhibited more positive attitudes than those faculty in the fields of science, engineering, and commerce and industry. Further, faculty who had previously taught students with disabilities exhibited more positive attitudes than did those faculty who had never had a teaching experience with a student with a disability. Fonosch and Schwab (1981) found that there was a significant difference based on the variable of gender, with females scoring higher, thus exhibiting more positive attitudes. Conversely, Schoen et al. did not find any significant differences based upon the faculty member's sex.

The attitudinal research conducted by Fonosch and Schwab (1981) and Schoen et al. (1987) is delimited by the fact that the initial sample pools, the university faculty, are skewed with more respondents representing one of the variables described in the studies. The research conducted by Schoen et al. contained a sample with more male representation than females. During the mid-1980s it was not uncommon for more males to be in faculty positions in academia than females and also for more males to be employed in specific academic disciplines such as engineering, science, and commerce and industry. The Fonosch and Schwab research regarding the effect of academic discipline upon attitude is limited by the small sample size of some of the academic

disciplines surveyed in the study. Thus, the representativeness of the samples to other academic institutions is questionable. Positively, both research undertakings recommended that faculty training programs related to students with disabilities be ongoing, since faculty exhibit the positive attitudes that would make them amenable to the acquisition of knowledge. Researchers suggested that specific educational strategies be implemented to encourage attitude change through enhanced communication (Fonosch & Schwab, 1981).

Schoen et al. (1987) measured faculty attitudes in postsecondary settings utilizing the ATTDS scale. This questionnaire contained 32 items that described situations involving disabled students that could occur in the classroom. Faculty members were asked to rate their degree of agreement or disagreement with statements using a 5-point Likert scale. The use of this instrument and the use of the ATDP scale previously described (Eichenger et al., 1991) pose several limitations that can adversely affect study results and the ability to generalize results to populations outside of the selected samples.

The ATDP and the ATTDS scales do not consider the general composition of the target sample of the site in which the instrument is implemented. Thus, inferences regarding specific variables such as gender must be cautiously interpreted. Second, there is no reference to the number of disability services provided or the number of students with disabilities in the venue in which the instrument is utilized. These factors could serve to sensitize the respondents toward disability issues and are not considered in

overall study recommendations. Finally, the scales do not specifically describe disability conditions. Instead the ATDP and the ATTDs scales contain reference to disability groups in a broad sense. This over-encompassing reference lends itself to differing interpretations and perceptions regarding the impact of a disability. Disability labels can lead to stereotypic inferences regarding capabilities and limitations (Rose, 1993), thus these labels may bias the findings that result from the use of the attitude instruments. This delimitation is evident whether the setting is general, as is the case with the ATDP scale or whether the setting is specific to a university setting, as is the case with the ATTDs scale.

To address the limitation associated with the broad disability reference contained in the scales described above, some researchers have developed their own instruments to assess faculty attitudes (Aksamit et al., 1987; Baggitt, 1993; Farrell & Harckman, 1988). Farrell and Harckman developed an attitude scale that was specific to the learning disabled student population at a northeastern university. The instrument was found to be reliable and valid prior to its implementation. The question posed in this research was whether there was a significant difference between the attitudes toward disabled students presented by faculty and those attitudes presented by disability service professionals. At the .05 confidence level, it was found that the student services staff scored significantly higher than the faculty regarding attitudes toward students with disabilities.

Although this study is limited by its small sample size (21 faculty and 58 disability service personnel), the recommendations postulated by Farrell and Harckham (1988) are important for future research undertakings. The researchers suggested that training

methodologies be individualistic in nature, considering the variable needs of learners and the scarcity of resources typically provided for training in higher education settings. This recommendation provides justification for the use of a training intervention that is user directed, as is the case with multimedia training programs.

Utilizing a self-developed questionnaire, researchers Aksamit et al. (1987) answered the question, "What are the self-reported attitudes and knowledge of student services staff and teaching faculty concerning LD students?" (p. 54). In a review of the literature regarding the relationship between knowledge and attitudes, this research undertaking is cited more than any other and is used as the foundation for numerous research studies that support the use of faculty training in postsecondary settings (Farrell & Harckham, 1988; Houck et al., 1992; Leyser, 1989; Satcher, 1992b). The 22-item questionnaire developed by Aksamit et al. consisted of two subscales. Eleven items in the survey were used to assess faculty attitudes and 11 items were used to assess faculty knowledge. The knowledge subscale of the questionnaire was used in this current research undertaking and was modified to be consistent with the specific objectives of this research. Appendix B contains the original knowledge subscale developed by Aksamit and her colleagues. Appendix C contains the knowledge scale utilized in this current study as both the pretest and posttest instrument. The original knowledge subscale was validated by a panel of 10 professionals for face and content validity. Reliability analysis using Cronbach's Alpha yielded a coefficient of .82. However, no information was provided regarding a description of this panel, other than the fact that these individuals represented special education and postsecondary education fields. Additional

information pertinent to the process that the panel of experts underwent in order to be able to report content validity and reliability would have enhanced the credibility of this research undertaking. Further, a description of the panel of experts including the nature of their professional experience would have enhanced the legitimacy of the report of content validity and reliability.

The study by Aksamit et al. (1987) was conducted at a midwestern land grant university with a student enrollment of approximately 22,000 students. The initial survey was mailed to faculty and student services personnel with a response rate of 53% from faculty and 60% from student service representatives. Independent variables measured in this study included group (student services or faculty) and demographics (sex, previous information, previous contact, and years of experience). The two dependent variables were the subjects' scores on the attitude and knowledge subscales of the survey instrument. Analysis of variance was the statistical methodology utilized to assess survey results.

Findings indicated that on the attitude subscale, faculty, and student services personnel held generally positive attitudes (mean of 45.92 out of a possible 66 points). This value fell on the positive side of the 6-point Likert scale of responses. A mean of 35.79 on the knowledge subscale fell on the disagree, or less positive, side of the scale. Aksamit et al. (1987) suggested that program planners use the information regarding the positive attitudes held by respondents to develop training programs, since, positive attitudes indicate a willingness to accept new information.

Results pertinent to sex, previous contact, presence of information, and years of experience revealed that attitude was related to these variables. These results are consistent with the findings of Fonosch and Schwab (1981) previously discussed. The most significant finding among these variables was the fact that the presence of knowledge about disability issues resulted in significantly more positive attitudes and greater knowledge. The researchers concluded that if staff development training focused upon the dissemination of appropriate information about disabilities, attitudes and knowledge can be positively affected.

The research conducted by Aksamit and her colleagues (1987) was one of the first studies to examine the relationship between attitudes and knowledge through the use of a survey instrument. Further, based upon the research findings, the researchers were able to make recommendations regarding service intervention and training needs. Inservice programs should address topics such as, "I know where to refer LD students," "I can recognize LD students," "I know when to assist LD students," and "I know how to offer assistance to LD students" (Aksamit et al., 1987, p. 58). However, the investigators failed to provide any recommendations regarding the type of methodology that would be most effective in addressing these questions. Additionally, the study is delimited by the fact that the research was conducted at only one university. The demographic variables, such as number of students with disabilities at the institution or disability groups, were not explained by the researchers. There was little information presented regarding the students with disabilities on the campus or the modes of training that were in place at the time of the study. These variables could have impacted upon the responses of the subjects

who had been exposed to disability issues through their experiences with students with disabilities or their work with the programs offered at the university.

More recently, Baggitt (1993), in a doctoral study at the University of Massachusetts at Amherst, surveyed 429 faculty to identify the relationship between knowledge and attitudes. Surprisingly, approximately 65% of the respondents were unfamiliar with the disability services rendered at their university. Baggitt recommended that the program administrators at the university increase their efforts to reach out to the faculty community regarding available services.

The instrument that Baggitt (1993) utilized to assess faculty attitudes and knowledge was developed based upon the unique characteristics of the University of Massachusetts at Amherst. However, although a panel of experts was used to support the development of the questionnaire, Baggitt offered no information regarding the reliability of the assessment instrument. Baggitt comprehensively discussed the guidelines for the development of a questionnaire such as clarity of items; however, there was no discussion pertinent as to how or why decisions were made to include certain questions in either the knowledge or attitudes scales of the questionnaire.

Positively, the research included a qualitative component in which respondents could offer information through open-ended questions and interviews. Subjects provided information to the researcher regarding their preferred mode of receiving disability related information. Some of the training interventions identified included student panels, consultants, sensitivity awareness sessions, and workshops. Important in this analysis is the acknowledgment that whether faculty were receptive toward the

information presented through training was contingent upon the training modality utilized.

The overall purpose of the studies previously described is the measurement of attitudes toward people with disabilities. An analysis of these studies strongly suggests that inservice education for college faculty can make a significant difference in facilitating positive attitudes. It is important to explore this topic because attitudinal barriers have been cited as an impediment in the development of programs and services for students with disabilities in higher education (Gajar, 1992; Houck et al., 1992). The willingness of faculty and administrators to provide instructional accommodations often depends on individual attitudes and knowledge (Rose, 1993). To ensure a positive environment for students with disabilities and increase the likelihood of their success, most service delivery models have staff development and knowledge enhancement as their components (Gajar, 1992).

Staff development programs that appear most effective in ultimately affecting attitudes focus upon integrating the needs of faculty and administrators with the needs of students (Bursuck & Rose, 1992). Faculty awareness programs should be developed to enhance awareness of faculty regarding how to interact with students with disabilities through the presentation of tangible information regarding specific instructional modifications (Smith & Nelson, 1993). The modality of staff development intervention can be through group discussion, disability simulations, presentation of information on disability conditions, and contact with students with disabilities (Salend et al., 1985). Faculty handbooks and awareness programs lead the way in recommended practices

("Focus on Faculty," 1987). However, one underlying tenet of inservice programs pertinent to the dissemination of information regarding disability issues in higher education is the active involvement of the learner.

Bursuck and Rose (1992) recommended that inservice programs be as interactive as possible in order to facilitate discussion regarding personal feelings and frustrations by both faculty and staff. Personnel should leave staff development activities with a full understanding of legislative mandates, general issues related to disability conditions, student concerns, faculty concerns, and means to enhance the use of resources to provide reasonable accommodations (Rose, 1993). Ultimately, these attitude change strategies that include the dissemination of information will positively affect the role that faculty have in facilitating the success of students with disabilities in higher education settings. Many of the difficulties related to adjustment to the college culture that are experienced by students with disabilities are mitigated through the presentation of accurate and factual information related to the needs of students with disabilities (Putnam, 1984; Rose, 1993).

The Campus Climate

The research previously discussed substantiates the relationship that exists between the presentation of disability-related information and the development of positive attitudes. It is clear that the acquisition of knowledge will favorably impact upon faculty attitudes toward students with disabilities in higher education settings (Aksamit et al., 1987; Houck et al., 1992; Putnam, 1984; Rose, 1993), thus creating a better campus climate for students and faculty.

In order to attempt to identify the effectiveness of training interventions related to faculty development and students with disabilities, it is necessary to examine related issues that may impact upon the choice of methodology. This section contains a review of research that focused upon student perceptions of campus climate and factors impacting upon personal success, faculty willingness to accommodate students with disabilities, disability services rendered at the campus level or nationally, and the effectiveness of specific training modalities. This literature is proactive in that the analysis of the data obtained is used as the foundation for service delivery. The insight offered through the recommendations presented will further justify the need to identify modes of staff development related to students with disabilities that are most effective in enhancing the academic environment for students with disabilities in postsecondary settings.

The Needs of Students

At the heart of services for students with disabilities are the students who are the recipients of these services. There are empirical undertakings that utilize students with disabilities as the target sample and attempt to answer the question, "What factors do you believe are important for your success in postsecondary settings?" (Edwards, 1992; Fichten, Goodrick, Tagalakakis, Amsel, & Libman, 1990; Horowitz, 1994; Kincer, 1991; Milne, 1989; Smith & Nelson, 1993; West et al., 1993).

There are research endeavors that utilize only students with learning disabilities (LD) as their target sample (Edwards, 1992; Milne, 1989). This is not surprising since in 1991, 24.9% of students with disabilities on college campuses are in this disability

category ("Percent of College," 1992). The remaining 75.1% of students with disabilities in higher education represent at least six other disability groups. Milne (1989) explored the experiences of college students with learning disabilities through the use of naturalistic inquiry and interviews to address the issue regarding what experiences have impacted upon their perceived success as a college student. Additionally, research utilizing a critical incident technique to ascertain information regarding the categories of critical incidents affecting success as reported by LD college students, is the basis for study (Edwards, 1992).

The outcomes of both of these research endeavors (Edwards, 1992; Milne, 1989) led to the conclusion that students with learning disabilities were not satisfied with the awareness level of faculty regarding accommodation needs in the classroom. Further, recommendations were made regarding the need for training and staff development to be incorporated into service delivery programs. Although these studies are limited in their scope through attention toward only one disability category, the issues raised can be extended to further research that is more encompassing in nature. Additionally, the use of experimental design methodologies is suggested to further identify elements of program delivery that can be deemed effective in enhancing awareness levels of faculty.

A similar method of inquiry as the studies previously described (Edwards, 1992; Milne, 1989), survey inquiry, was used in the research conducted by Smith and Nelson (1993) at a northwestern university. The researchers did not disclose the specific university at which the study took place. The intent of the research was to create a descriptive account of the factors that college students with disabilities viewed as

important to their success. The sample consisted of 36 students with a variety of disabilities, represented all academic ranks, were both male and female, and were enrolled in a variety of academic curriculums. Researchers interviewed all 36 subjects to garner information regarding factors that influence their perceived success in the postsecondary setting. An analytic deductive strategy was utilized to categorize narrative information provided by students. The ten factors that were cited by students with disabilities as important for their success could be divided into two general categories: personal beliefs and social support/campus climate.

The topic of faculty awareness and knowledge was identified in the factor, interaction with faculty, and was included in the social support/campus climate category (Smith & Nelson, 1993). Only 30% of the respondents reported that faculty were supportive or made attempts to work closely with them. Students indicated that developing a professional relationship with, being encouraged by, and/or receiving feedback and information from faculty was important to their academic success. Interestingly, of lesser concern to these students was obtaining actual help from faculty regarding academic concerns. As was previously discussed, this finding contrasts sharply with the findings of Edwards (1992) and Milne (1989), who found that students perceived that a faculty member's ability to make academic accommodations was the greatest need and presented the greatest barrier for success in the postsecondary environment. An explanation for the more in-depth findings apparent in the Smith and Nelson study may be because of the small sample size (36 subjects), as opposed to the 74 subjects in the study conducted by Edwards. The small number of participants may have

allowed researchers to spend more time with subjects in the naturalistic inquiry process. Further, we are presented with little information regarding the relationship that these researchers had with research subjects or the climate of the northwestern university regarding the provision of services for students with disabilities. Perhaps a relationship existed in some of these cases that could have facilitated respondents to disclose more information. Additionally, the campus environment may be positive for students with disabilities. Respondents may have perceived that researchers would be receptive toward the disclosure of information, and this information would be used to benefit the campus climate for all students with disabilities.

Research conducted at the University of Florida substantiates the findings regarding the need for faculty training programs (Horowitz, 1994). A mail survey was forwarded to 252 students registered as a student with a disability through the Office of Student Services. Students were queried regarding their use and satisfaction with services at the University of Florida and were asked to provide recommendations regarding future service needs. Although only an 18.7% response rate was evident, Horowitz was able to make inferences based upon research results. *

Overall, approximately 75% of the respondents indicated that they were satisfied with the services currently being rendered at the university. However, Horowitz recommended that although response rates were low, the 25% of the respondents who indicated dissatisfaction with service provision warrants acknowledgment by university administrators and should be used as the basis for the examination of existing programs. Further, students reported a need for increased faculty and staff awareness regarding

students with disabilities. Horowitz (1994) recommended that training opportunities be made available to faculty and staff at the University of Florida with an emphasis upon "increasing awareness regarding the nature of disabilities, their own responsibilities under the law for providing an appropriate education to a student with a disability, how to work with a student with a disability, and how to alter procedures" (p. 68).

In a broader study, through a questionnaire format, researchers West et al. (1993) surveyed 761 students with all types of disabilities in 57 public and private higher education institutions in Virginia. The sample represented a 30.4% response rate and included students in all academic ranks (freshman, sophomore, junior, senior, graduate), males and females, individuals in age ranges from under 35 to over 35, students with a variety of disabilities, and students in 4-year institutions and community colleges. The heterogeneity of the sample utilized in this research ensures that the findings can be generalized to a larger population.

Students were questioned regarding their satisfaction with the current service delivery programs at their respective institutions. Satisfaction levels ranged from 70.5% in response to the question, "How satisfied are you with the physical accessibility of public-use areas in new campus construction?" to a 45.2% satisfaction rating to the question, "How satisfied are you with the participation of students with disabilities in developing disability related policies and services?" (West et al., 1993, p. 460). In response to the question, "How satisfied are you with your school's faculty in making accommodations or modification to meet your needs?" 67.1% of the sample indicated that they were satisfied (p. 460).

The finding of dissatisfaction by students is reiterated in the response rates to the question, "What major barriers have you encountered during your postsecondary education as a result of being a student with a disability?" (West et al., 1993, p. 461). Eighty-six percent of the respondents indicated that they had encountered barriers, with the majority of these students enrolled in 4-year public and private institutions as opposed to community colleges. Many of the barriers reported by students were related to services and accommodations and were disability specific, such as architectural barriers, limited availability of tutors and note takers, and lack of awareness of available services at their institutions. The barrier most cited by respondents that could be generalized across all disability groups was the obstacle related to a lack of understanding and cooperation from class instructors and professors.

Nearly two-thirds of the sample of students with disabilities offered suggestions for program improvement. Among these recommendations are the need for increased awareness and funding of services for students with disabilities, improving the consistency of service delivery, involving students in policy and planning, and educating faculty and staff regarding disability issues and accommodation needs.

The qualitative study completed by West and his colleagues used survey methodology. There was no experimental intervention evident in this design. However, the information generated through a qualitative methodology serves as a good foundation for further research related to service effectiveness. The research conducted by West and his colleagues is the springboard for empirical undertakings that address some of the recommendations postulated, including an assessment of the various roles that students

take in policy development, factors that influence faculty's willingness to provide accommodations to students with disabilities (Nelson et al., 1990; Satcher, 1992b), what services are typically a component of programs for students with disabilities in postsecondary venues (Beirne-Smith & Deck, 1989; Marion & Iovacchini, 1983; McAfee & Sheeler, 1987; Nelson & Lignugaris/Kraft, 1989; Woods, Sedlacek, & Boyer, 1990), and what faculty training interventions are most effective in enhancing knowledge (Leyser, 1989; McCarthy & Campbell, 1993; Morris, Leuenberger, & Aksamit, 1987). These questions were addressed in subsequent research that will be explored in the forthcoming sections of the chapter.

Faculty Willingness to Provide Accommodations

As was the case with some of the studies discussed in the previous section, the research explored related to faculty willingness to provide accommodations and utilized students with learning disabilities as the targeted sample (Nelson et al., 1990; Satcher, 1992b). Both research undertakings used a questionnaire to survey faculty regarding their willingness to provide classroom accommodations to students with disabilities. Nelson et al. surveyed 107 faculty at a northwestern college, while Satcher utilized the questionnaire methodology to poll 93 faculty at 13 Mississippi community colleges. A response rate of 75.8% was realized by Nelson, Dodd, and Smith, and a 37% response rate was identified in the Satcher research. This disparity in response rates between these two studies, despite the similarity of research objective and research question, may demonstrate the difficulty that researchers may have in studies that extend beyond a particular higher education institution.

Nelson et al. (1990) obtained their sample from one university setting. The high response rate could have been representative of the collegiality found on college campuses that can serve to provide pressure for faculty to involve themselves in research beyond their academic responsibilities (McCarthy & Campbell, 1993). In contrast, Satcher (1992b) surveyed faculty from 13 campuses throughout the State of Mississippi. The collegiality and peer pressure that is demonstrated at the individual college level is not expected to span 13 campus settings. This may be one reason regarding why the response rate was 37% as opposed to the almost 76% response rate evident in the Nelson et al. research.

Through analysis of variance and descriptive analyses, Nelson et al. (1990) found that differences were evident regarding the degree to which faculty were willing to make accommodations based upon their academic discipline. Professors in educational and social science disciplines were more receptive toward making accommodations than were faculty in business domains. This supports the findings (Fonosch & Schwab, 1981; Schoen et al., 1987) that were discussed in previous sections of this chapter.

An analysis using descriptive statistics was completed by Satcher (1992b) to answer the question regarding faculty willingness to provide accommodations to students with learning disabilities. The researcher found that, overall, community college faculty were comfortable with providing accommodations to students. However, faculty expressed concerns pertinent to their large teaching loads and time constraints that may adversely impact upon their ability to provide individualized accommodations. Other faculty expressed concerns regarding students with more severe disabilities who may be set up

for failure if they are pressured to pursue postsecondary educational goals. An emergent theme throughout this research was the balance that is required between the academic integrity of the college curriculum and the individual learning needs of students with disabilities in higher education settings.

A Review of Service Delivery Programs

In 1983, the impact of Section 504 of the Rehabilitation Act was experienced in higher education settings. A review of service delivery systems in place at universities across this country was the platform from which many university-based programs took off. A review of 155 of these programs in 1983 was the focus of the survey research conducted by Marion and Iovacchini (1983). Additionally, the researchers utilized chi-square analysis to make inferences regarding demographic variables that may impact upon the delivery of programs for students with disabilities in higher education settings.

A 38% response rate characterized this survey (Marion & Iovacchini, 1983). One of the positive findings was that all of the institutions that responded did have a compliance officer at the university level who was responsible for disability related issues. All institutions offered specialized services for students with disabilities, although specific descriptive information regarding these services was not discussed. The researchers measured whether universities were compliant with legislative mandates based upon whether a staff person was assigned to the job of compliance officer. Little information was presented regarding the quality, variety, or nature of services rendered in postsecondary settings. It would be interesting to survey students at these same universities to ascertain their perceptions regarding the university responses to legislative

issues. Regardless of whether institutional administrators indicated that they have a compliance officer, disability service programs, or faculty training programs, the true merits and impact of these programs cannot be realized without assessment and measurement. The feedback generated by the recipients of services through these programs, such as faculty or students, is the ideal source for feedback pertinent to effectiveness.

The conclusions drawn regarding the Marion and Iovacchini study can also be inferred from the literary research conducted by Nelson and Lignugaris/Kraft (1989). A meta-analysis of literature pertinent to service delivery for students with disabilities in higher education at the national level examined 31 articles prior to 1989 (Nelson & Lignugaris/Kraft, 1989). The references included in this analysis focused upon the types of services delivered and descriptive accounts of specific college-based programs. The analysis was completed in order to make assessments of service delivery for students with disabilities at the national level. The target sample of the study was programs for students with learning disabilities.

Findings indicated that out of the 14 articles examined containing information regarding specific disability related programs, 12 discussed the necessity of counseling services for students with learning disabilities. Counseling services consisted of personal counseling, academic counseling, and career counseling. This is in sharp contrast to survey results identified by Woods, Sedlacek, & Boyer, (1990). Woods et al. surveyed eighteen large state universities. Of the thirteen respondents, only 39% indicated that their service delivery programs contained counseling related services. The ambiguity of

the term counseling could have led to misinformation presented by the respondents. If no clear-cut definition of the term is available, and no delineation of specific behavioral outcomes of counseling are included in the survey questionnaire, a respondent could choose to report that any type of service falls under the realm of counseling. This may explain the sharp disparity between the reported use of counseling services by 100% of the respondents in the 1989 survey (Nelson & Lignugaris/Kraft) and only a 39% reported use in the 1990 survey (Woods et al., 1990).

Results indicated that the majority of service delivery programs in higher education settings consisted of instructional accommodations (Nelson & Lignugaris/Kraft, 1989; Woods et al., 1990). These accommodations are provided at the college level, such as note takers or tutors, or at the faculty level through academic adjustments such as test modification and varying time allotted for exams. The final finding of the literary meta-analysis was the availability of administrative accommodations, such as variability in admissions policies.

This survey research methodology (Nelson & Lignugaris/Kraft, 1989; Woods et al., 1990) provided a comprehensive picture of service delivery in a purely descriptive manner. There was little discussion regarding program effectiveness or the impact of service delivery programs upon the success of students with disabilities in postsecondary settings. Although the conclusions and recommendations purported by the researchers emphasized the need to examine component effectiveness, there was little discussion regarding how this might be done. Missing from the review of literature pertinent to service delivery was information regarding faculty development programs. Although

instructional modifications were cited as an integral component of service delivery systems for students with disabilities in higher education, there were no recommendations made pertinent as to how to enhance faculty willingness to provide these accommodations.

The Effectiveness of Training Methodologies

A pretest-posttest control group design is commonly used to test the effectiveness of the implementation of a training modality (Borg & Gall, 1989). Morris, Aksamit, and Leuenberger (1987) utilized such a design to address the question, "Does participation in specific faculty inservice training influence college faculty members' attitudes toward, and knowledge about, students with learning disabilities?" (p. 60). Eighty faculty members were randomly selected and were asked to complete a questionnaire developed by the same researchers in an earlier study (Aksamit et al., 1987). Appendix B is the knowledge subscale of the original instrument.

The instrument originally contained two subscales including an attitude subscale and a knowledge subscale. As will be discussed in the Chapter 3, the methodology section, this scale was utilized as the basis of this current research and was modified to be consistent with the demographics of this research. Reliability coefficients of .82 for the knowledge subscale and .86 for the attitude subscale were obtained by the original authors (Morris et al., 1987). The pretest-posttest served as the dependent variable measure in the research.

Experimental intervention consisted of personal contact with professionals experienced in working with students with learning disabilities, small group inservice

presentations, and written materials. All inservice materials and activities were designed to increase the faculty member's informational levels and knowledge of students with learning disabilities. The overall intent of the research was to decrease faculty discomfort levels associated with instructing students with learning disabilities and simultaneously increase their positive interactions. The control group did not receive inservice education regarding students with learning disabilities. Data analysis was conducted through descriptive statistics and two-way analyses of variance.

Findings indicated that there was a significant difference between the posttest scores of the experimental and control groups. Subjects in the experimental group scored significantly higher on the knowledge subscale based on follow-up analysis. On the attitude subscale, participants who received inservice training over time showed no significant differences in their attitude scores on pretest and posttests. However, there was a significant change in the pretest-posttest scores for the control group that represented a decline in their attitude scores.

Researchers concluded the following; "inservice training is effective for increasing faculty knowledge about learning disabilities; without inservice training, faculty attitudes become significantly less positive; multiple inservice contacts over time are necessary to have an impact on faculty attitudes and knowledge" (Morris et al., 1987, p. 63). This third finding is particularly important in the planning and implementation of training programs at the postsecondary level. A single training session was not effective in enhancing knowledge, thus program planners should consider shorter inservice programs

on an ongoing basis to achieve maximum effectiveness in the higher education setting (Morris et al., 1987).

Although the focus of this research is targeted toward a specific disability category (learning disabilities), there is no indication that the findings cannot be generalized to programs whose focus is across disability groups. It is unrealistic to believe that faculty will have contact only with students with learning disabilities. Although this is one of the largest disability groups represented in higher education ("Percent of College," 1992) and the number of students with learning disabilities is expected to continue to rise (Rose, 1993), the legislative and economic impetus for students with disabilities to enter the postsecondary setting pertains to all students with disabilities, regardless of specific disability category. The examination of the effectiveness of training interventions should focus upon the modality's impact upon faculty knowledge related to all disability groups because this is more typically the norm on the college campus.

Through a questionnaire and open-ended question format, Leyser (1989) surveyed 124 faculty teaching at a large state university with an enrollment of approximately 24,000 students. The objectives of the research were to obtain data regarding faculty knowledge of disability laws, assess their level of commitment toward providing accommodations, and assess their attitudes toward the integration of students with disabilities in higher education.

Findings indicated that faculty were knowledgeable regarding legislation affecting postsecondary services. Forty percent of faculty indicated that they were knowledgeable regarding legislation, 70% implemented classroom accommodations and the majority,

86.8%, had experience with students with disabilities in postsecondary settings (Leyser, 1989). Almost 50% of the faculty (49.6%), indicated that they had participated in faculty development activities. Through open-ended questions, faculty were asked to provide suggestions regarding how the university could improve the preparation of teachers to better instruct students with disabilities in their classes. Most respondents stressed the need for a greater dissemination of information through inservice activities, workshops, listings of resources and services, and more guest speakers in classes. Ironically, only about half of the respondents indicated that they utilized the resources currently available at the university, which is consistent with their recommendation regarding the need for the dissemination of more information pertinent to available services and resources.

In similar research, McCarthy and Campbell (1993) surveyed 312 faculty from an initial sample pool of 955 full-time faculty at a land-grant research university. This represents a 28% response rate. This low faculty response rate may be indicative of the time constraints that faculty face on a daily basis. There are always pressures for faculty to conduct research in the university setting, in fact, promotion and salary decisions are often based on research endeavors (McCarthy & Campbell, 1993). Any activity that distracts faculty members or takes them away from research activity may be viewed negatively, thus the low response rate. Consequently, there is little incentive for faculty to participate in extracurricular training activities.

Faculty strive to achieve a balance between spending time in inservice training related to student issues and time in research endeavors. This is substantiated by the finding that only 50% of the respondents answered positively to special interest sessions

(McCarthy & Campbell, 1993). When presented with specific options for modes of staff development, 36% of the respondents expressed a willingness to participate in a workshop or seminar; 46% supported an information exchange, and 58% supported reference materials.

Undeniably, faculty time for participation in inservice training and staff development is limited. University administrators and program planners must struggle to implement training interventions that have the maximum benefit in a time efficient manner. The idea of individualized training, through the use of an interactive training modality appears to address the issue related to time management reflected in the study completed by McCarthy and Campbell (1993). Faculty can complete the training intervention at their own convenience and would not be required to attend structured workshops at times that conflict with research endeavors. When a county in California implemented multimedia to teach a word processing program, the benefits of the individualized instruction were realized. The Information Center Manager indicated, "It's training in somebody's office at their convenience rather than ours. And you can train people in a mode that can allow them to make mistakes without feeling foolish" (Beer & Freifeld, 1992, p. 192).

Unfortunately, there is little mention of the use of technology to support training for faculty in higher education settings. However, the successful use of individualized computer training and multimedia in other industries gives credence to the use of this modality to enhance faculty knowledge of students with disabilities in higher education

settings. A review of the successful implementation of multimedia technology for training interventions is presented in the forthcoming sections of this chapter.

While the importance for faculty training is acknowledged in theoretical and empirical discussion, there is little agreement on the kind of training that is most effective (Schuck & Kroeger, 1993). Researchers suggest that exploration needs to be ongoing regarding training interventions that lead to a more sensitive and supportive environment for students with disabilities in postsecondary settings (Houck et al., 1992).

Cognitive Flexibility Theory

Many traditional forms of instruction do not help the learner make the transition from "knowing that something is true to knowing how to think, learn, and solve problems" (Bransford & Vye, 1989, p. 193). This new way of perceiving instructional methodologies necessitates a shift from factual information presented in a linear fashion to modes of instruction that offer the learner use-oriented knowledge. This mode provides the learner with the ability to conceptualize learning material and allows for problem solving to new and varying situations. This methodology is characterized by learning by doing and necessitates an active learner who is given the opportunity to guide the instructional process contingent upon individual learning needs.

Cognitive flexibility is the ability of a learner to spontaneously restructure one's knowledge in adaptive response to radically changing situational demands, both within and across knowledge application situations (Spiro & Jehng, 1990). This is a function of both the way knowledge is represented and the processes that operate on those mental representations. Cognitive flexibility theory supports learning when material is complex in nature and when transfer learning and application are expected. When learning material is complex or ill-structured, often multiple representations of information need

to be presented in order for the learner to develop mental representations that are open, rather than rigid and linear. Researchers have postulated that it is the oversimplification of complex knowledge that adversely affects learning (Jacobson & Spiro, 1993). Thus, the use of principles associated with cognitive flexibility theory in instructional modalities can diminish the oversimplification that can occur in learning environments. The representations developed through cognitive flexibility principles incorporated into instruction can then be applied to new problem situations outside of the learning venue.

These representations often utilize authentic tasks to enable the learner to acquire information that has applicability outside of the training domain. This can be accomplished when abstract concepts are linked to case examples (Jacobson & Spiro, 1993). Through case examples and problem solving scenarios, the learner is involved in a situated learning experience that will facilitate the development of understanding, rather than simply the presentation of information (Merseeth & Lacey, 1993; Winn, 1993). This arena for learning is the foundation for higher-order thinking that necessitates that learners manipulate information and ideas into meaningful information (Newmann & Wehlage, 1993).

Case-based instruction, as a component of cognitive flexibility theory, impacts upon learning in several ways. Researchers Merseeth and Lacy (1993) indicated that the use of scenarios enables the learner to develop skills in critical analysis and problem solving, hence transfer of learning is more likely to occur. Second, case methods allow complex information to be presented in a manner in which the learner can understand. Finally, authentic learning opportunities through case-based instruction allow the learner

to be actively involved in the learning situation. The role of the learner changes from a passive receiver of information to an active participant.

Another important premise underlying cognitive flexibility theory is that new knowledge must be actively constructed by learners (Bransford & Vye, 1989). When learning is characterized by a non-linear approach, this enables the learner to understand material through multiple mental representations of material and produces cognitive flexibility. Ultimately, the learner will be able to re-assemble the diverse pieces of knowledge to fit the specific needs of a situation, thus transfer of learning and application to real world problems is accomplished.

In order to test the tenet associated with cognitive flexibility theory related to transfer learning, Jacobson and Spiro (1993) used 34 college-aged subjects randomly assigned to one of two experimental conditions. The content of the instruction was the impact of technology on the twentieth century and was presented using alternate instructional modalities as part of the experimental interventions. Experimental group one received instruction utilizing a thematic criss-crossing hypertext format that allowed a theme-based exploration of the material in a non-linear fashion. The modality encouraged the development of abstract conceptual information by the learner through the incorporation of case-specific information. This group also received a hypertext treatment in the second phase of the design, the study phase. Concurrently, the second group, the minimal/drill control group, completed a computer-based drill regarding facts and thematic concepts. It was hypothesized that the control group (non-hypertext) would achieve higher on memory tests of factual information, and the subjects utilizing the hypertext intervention based upon the tenets of cognitive flexibility theory would

perform better in novel situations that required transfer learning. The authors presented no information regarding what instrument was used to measure achievement effects subsequent to the training intervention.

Findings indicated that the students in the experimental group who had utilized the hypertext methodology were better able to utilize the conceptual interrelationships that were taught in new situations. The results of the group of students who had utilized the drill/practice modality may be effective in learning situations that require the recall of factual information but are less effective for learning environments that necessitate the application of this material to novel situations. Further research is warranted to explore the contextual variables that may affect transfer of learning as well as to identify, in a more rigidly controlled experimental situation, what intrinsic subjective factors impact upon the ability of the learner to apply new information in venues outside of the learning environment.

Multimedia as a Pedagogical Approach

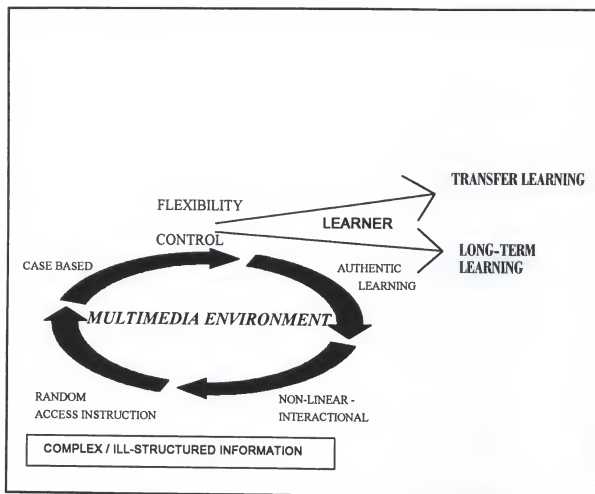
Hypermedia and hypertext instruction are used synonymously with multimedia. Hypertext technology is characterized by systems that enable a large amount of information to be stored in a variety of mediums (Quade, 1993). This information can then be linked through branching and button commands and is at the learner's discretion as to which path to take. These features can be incorporated into multimedia software systems that allow the information to be presented through a multidimensional process such as through the use of text, graphics, video, or sound. These types of instructional tools utilize the premises of cognitive flexibility theory.

Cognitive flexibility as a theoretical foundation for learning necessitates that information be presented in a variety of ways to enable the learner to develop conceptual understanding of material. The interrelationships that develop can be applied to problem solving situations outside of the learning environment (Jacobson & Spiro, 1993).

Random access instruction is an important attribute of hypertext and multimedia technologies. Random access instruction is characterized by its non-linear and multi-dimensional approach to instruction and is ideally suited to facilitating the application of cognitive flexibility theory to learning (Spiro & Jehng, 1990). Hypertext technologies with interactive capabilities offer the learner random access instruction. This training modality is consistent with the underlying tenets of cognitive flexibility theory, namely, a non-linear presentation, multi-dimensional in nature, and has the potential for user directed exploration of the various conceptualizations of learning material. The tenets of cognitive flexibility theory as they apply to a multimedia environment are graphically represented in figure 2-1.

Flexibility/Multi-dimensional

There is controversy regarding the theoretical premise underlying the effectiveness of interactive computerized instructional modalities (Bain, Houghton, Sah, & Carroll, 1992; Cronin & Cronin, 1992; Larsen, 1992; Levin, 1991; Quade, 1993). The ability of multimedia to incorporate branching and non-linear formats has been used as an explanation to support the effectiveness of this technology (Goldman & Barron, 1990; Knight, Acosta, & Anderson, 1988; Spiro & Jehng, 1990) and also to refute the viability of multimedia as a tool for learning (Lanza & Roselli, 1991; Sawyer, 1988).



The characteristics of the multimedia environment (case-based, authentic learning, non-linear, and random access instruction) that impact upon the learner's flexibility and control of the material. Transfer learning and long-term learning are facilitated by these characteristics.

Figure 2-1: Model of the Incorporation of Cognitive Flexibility Theory into Multimedia Application.

The tenets of cognitive flexibility theory are well suited to learning environments where the material is complex and ill structured in nature (Spiro & Jehng, 1990). Thus, the use of multimedia as an instructional methodology may be appropriate in these learning situations. However, there are situations in which the flexibility of multimedia instructional design is not consistent with the overall objective of some instructional material. Research indicated that college students using a computerized study guide versus a traditional study guide for a general psychology course did not achieve higher scores on a multiple-choice examination (Sawyer, 1988). What differentiated the study guide material from more complex conceptual learning material is that the study guide represented drill and practice experiences. A study guide is intended to complement a course text and is not intended to introduce new material. The material, although presented through a computerized format, did not have flexible options where the learner could choose their own path. The material was presented in a linear fashion through text, using none of the multi-dimensional capabilities of multimedia technology.

The structured instruction evident in drill-and-practice tutorials does not consider the learning style of the individuals who use these programs. The framework of the instructional approach is linear and decisions regarding sequencing are controlled by the system rather than the learner (Lanza & Roselli, 1991). The flexible approach apparent in multimedia instructional methodologies gives users the freedom to move around the instructional material, allowing them to constantly make decisions and evaluate their progress. The impact of these multimedia features upon learning was tested in an experimental and control group design implemented in a postsecondary educational environment (Lanza & Roselli, 1991). The researchers hypothesized that the features associated with multimedia, such as flexibility and multi-dimensionality, would lead to greater achievement.

Thirty undergraduate students were placed in a control group using a computer-based tutorial as the independent variable, while thirty students received a hypertext-based tutorial as the independent variable. The material covered in both the control group (computer-based instruction) and the experimental group (hypertext instruction) was similar, although, the researchers presented no statistical evidence regarding validity or reliability. The students were randomly placed in either group without regard to gender or prior experience. There was no pretest conducted, thus there is no indication of the possible impact of prior knowledge on posttest results.

Ironically, t-test analyses yielded no significant differences between the modes of instruction used as independent variables in this study. The flexible, multi-dimensional nature of multimedia instruction did not appear to positively affect student performance. Conclusions discussed by the researchers indicated that hypertext and multimedia instructional methodologies may not be suited to everyone. The flexibility inherent in the multimedia methodology may be more efficiently utilized by more motivated and mature learners (Lanza & Roselli, 1991), although Lanza and Roselli offered no discussion regarding how to measure these two traits. The findings identified substantiate the importance of individuality in the provision of learning services. The tools and techniques used, whether the population is university faculty or students, must be consistent with the learning needs of the trainees and the specific objectives of the training intervention.

Conversely, there is statistical evidence that when computerized tutorials do incorporate flexibility and multi-dimensional features, achievement levels can be positively impacted. Researchers Knight, Acosta, and Anderson (1988) implemented an experimental design to assess the effectiveness of a computerized tutorial program on the achievement level of secondary school students as measured by the ACT examination.

Thirty subjects were randomly placed in the experimental group (computerized tutorial) and the same number of subjects were randomly placed in the control group (text study guide on how to prepare for the ACT). Analyzing the data with a series of two-way analysis of variances using the ACT as the dependent measure, the researchers sought to answer the question, "Would the use of tutorial material prepared for use on the microcomputer result in significantly higher ACT scores than tutorial materials that were paper-bound?" (Knight et al., 1988, p. 86).

Results obtained indicated that the experimental group (those who used the computerized tutorial) achieved a significantly higher score on the ACT than did those subjects that had utilized the text based tutorial (a mean of 22.53 versus a mean of 19.40). The researchers postulated that the higher scores achieved by the students who had utilized the computerized tutorial could have been a result of the diagnostic capabilities of the computer program. Students were able to get direct feedback during the course of training, thus were able to select their own path based upon learning needs. The flexibility associated with the branching capability of the computer methodology provided a basis for self-directed problem solving, and as the students in the study indicated, they experienced a higher level of confidence especially in the areas of perceived weakness. However, lacking in this research was a pretest to measure the initial achievement level of subjects. The use of a pretest would have served as a covariant to remove the possible effect of prior knowledge on the dependent variable as measured by the student's score on the ACT test. A further delimitation of this study was the fact that the students voluntarily participated in the training experiences. Consequently, they were highly motivated to improve their ACT scores, thus they diligently participated in all training experiences. This factor should be considered when

generalizing results to target samples who are randomly selected and do not voluntarily choose to participate in training research.

Learner Control

An important tenet of cognitive flexibility theory is the active participation of the learner. Multimedia technology, through an interactive format, enables the learner to direct the course of instruction. "Learners must become active partners in learning, not passive sponges" (Day, 1993, p. 26). The sense of control experienced by the learner reflects a sense of self-determination, a feeling that one is in command of the learning environment (Larkin & Chabay, 1989). Researchers have indicated that, "learner control will maintain attention longer, involve students more deeply, and perhaps give students more insight" (Steinberg, 1989, p. 117). This sense of control is enhanced when the learner is active, rather than a passive observer in the instructional process. Types of learner control include control of pacing or the speed at which the instruction is administered, control of sequence or the order in which the material is presented, and learner control of content or the flexibility of the learner to choose the material that he or she wishes to cover (Milheim & Martin, 1991). These types of participant control can be increased through providing an instructional format that gives the learner the opportunity to choose the path they desire to take in the instructional process.

However, there are researchers who purport that the ability of the learner to control the course of instruction can serve as a hindrance toward learning (van den Berg & Watt, 1991) or more subtly, does not facilitate a greater understanding of learning material (Quade, 1993). As learners are able to maneuver throughout multimedia using a hypertext framework, they may experience confusion about where to go next. Research conducted at the University of Connecticut by van den Berg and Watt examined this issue. These researchers used three experimental conditions as the independent variables

in the posttest only experimental design that spanned three consecutive semesters. College students were randomly placed in a competitive condition during the first semester that was defined by students receiving statistical instruction using a programmed hypertext format while the remainder of their classmates simultaneously received traditional in-class instruction. During the second semester, the supplementary condition was tested whereby 30 randomly selected students used the hypertext material to supplement class lectures. In the third and final semester of the research, the hypertext modality was used as a replacement condition. The hypertext intervention served as the only source of learning statistical information for the student subjects. The researchers indicated that the hypertext tool was consistent with the lecture material; however, the researchers provided no statistical evidence of validity or reliability. The dependent measure in all three experimental conditions was the subject's score on a statistical examination administered at the conclusion of each semester.

Researchers hypothesized (van den Berg & Watt, 1991) that, based upon the possibility that the learner could get lost in the hypertext environment, the hypertext intervention would not be any more effective in enhancing student performance on an examination covering statistics content than a traditional lecture format. The results identified are consistent with this hypothesis. No significant differences were found between the competitive condition or the supplementary condition; in fact, students performance was the poorest in the replacement condition. This suggested that the use of the hypertext methodology as a stand-alone tutor was ineffective as a learning modality. However, in the competitive condition, students used the hypertext tool at the same time that students were receiving traditional lecture instruction, and no significant differences were found in the examination scores for all students. This raises questions regarding the

ability to conclude that the hypertext was any more or less effective as an instructional methodology than traditional means of instruction.

Students were asked to answer a series of subjective questions in fixed-response and open-ended formats regarding their perceptions of the hypertext methodology. Students in the competitive group evaluated the methodology significantly lower than those students in the supplementary condition. Students indicated that they liked this way of learning "significantly less" and also found it a significantly less "easy way to learn" (van den Berg & Watt, 1991, p. 121). This indicated that perhaps students perceived that they were missing information that could be delivered during a traditional lecture format.

These negative perceptions were substantiated through the open-ended question responses which indicated that 75% of the students in the competitive condition complained about the lack of an outline or guidance, while only 6% of the replacement condition members and none of the students in the supplementary condition complained. The students in the competitive condition could have felt deprived of the guidance that their peers involved in the lecture instruction were receiving. Students in the replacement condition could not have felt deprived since all students received only the hypertext instruction.

The findings of this research are congruent with the findings of others (Billings & Cobb, 1992; Lanza & Roselli 1991; Larsen, 1992; Steinberg, 1989) regarding the importance of understanding the learning styles of the participants in the training experience. The results also provide evidence regarding the importance of understanding the contextual environment in which hypertext methodologies are implemented. Perhaps, these factors are equally as important as the specific training material contained in the

instructional modality. With a comprehensive training plan (Harris, 1989), the adverse affect of these factors can be minimized.

Implications of Multimedia in Academic Environments

The personal computer is an integral component of instructional methodologies in higher education domains (Schumacker & Hossain, 1990). The development of sophisticated authoring software such as Freelance Graphics incorporates hypertext capabilities. Hypertext can be defined as a non-linear, multidimensional, semantic structure in which words are linked by associations (Tripp & Roby, 1990). The use of multimedia technology has far reaching potential for educational and training domains.

However, the dilemma resides in how instructors or trainers can use this technology effectively in the delivery of learning material. In a study that assessed faculty use of a campus-based computer learning center, Schumacker and Hossain (1990) concluded that faculty held positive attitudes toward implementing computers in instructional domains. Faculty perceived the use of computing technology as effective for the students in their classes. Thus, there is no reason to doubt that faculty would view the implementation of computing technology for training interventions equally as effective. However, Schumacker and Hossain recommended that further research be undertaken to identify the specific conditions and circumstances that impact upon whether the microcomputer modality for training and instruction is most likely to be effective.

Technology in education is recommended for several reasons: students learn and develop at different rates, students must solve complex problems, technology creates opportunities for students to complete meaningful work, and the use of technology maximizes productivity through efficiency (Peck & Dorricott, 1994). Multimedia as a technological vehicle reaches all the senses of the individual learner, thus it can be customized to individual learning styles (Day, 1993). However, only recently has the use

of multimedia been assessed for its pedagogical effectiveness. The multimedia programs are too new to have enabled expansive empirical research that delineate the modality's effectiveness (Jacobson, 1993). Although the use of multimedia as a training tool is based upon sound theoretical underpinnings through the tenets of cognitive flexibility theory, the application of the technology in specific domains warrants empirical investigation.

Investigation regarding the effectiveness of multimedia as a pedagogical tool are ongoing in many areas including the field of teacher education (Goldman & Barron, 1990). Researchers at Vanderbilt's Peabody College of Education have utilized multimedia technology to provide students with experiences in analyzing various aspects of elementary mathematics lessons. A new type of teacher education program is envisioned, including one that moves away from teacher-directed lecture format into a problem-solving/analytical mode (Goldman & Barron, 1990). The advantages of this pedagogical approach are well suited to the complex and ill-structured domain of teaching and learning (Merseeth & Lacey, 1993). The multimedia application enables learners to chart their own course, thus the computer becomes a tool that complements instruction rather than supplants instruction.

Hypertext technology through multimedia is being assessed in a variety of instructional domains. However, in some research undertakings the modality is not found to be more effective than traditional instructional methodologies (Levin, 1991), while in other domains, the methodology is found to be more effective than traditional methodologies (Bain et al., 1992). The need for ongoing empirical investigation regarding the effectiveness of hypertext methodologies utilizing multimedia technology is warranted based upon the inconclusive findings of previous research endeavors.

In a study that refutes the effectiveness of interactive technologies, the achievement level of seventh graders was found to be not positively impacted by the use of interactive technology when this mode was utilized in an earth science class (Levin, 1991). An important finding was that the way in which the presentation is constructed can have an impact upon learner achievement. In this situation (Levin, 1991), learners were more interested in using the flexible nature of the interactive program than attending to the content of the instructional material. Again, the importance of considering the situational elements in the instructional venue, including, learner characteristics may be as important as the content of the training material (Billings & Cobb, 1992).

Interestingly, interactive modalities are also used to teach students in less structured domains. Hypertext intervention was found to be more effective than traditional lecture instruction in enhancing social problem-solving ability by adolescents (Bain et al., 1992). The area of social skills education is an ill-structured and complex domain (Spiro & Jehng, 1990) as compared with a study guide provided in a linear fashion (Sawyer, 1988) or earth science education adapted to students in the seventh grade (Levin, 1991). As was recognized by Spiro and Jehng, the nature of the instructional content must be considered in the application of hypermedia technologies. It is apparent that some material is more amenable to the use of multimedia technologies based upon its characteristics that are commensurate with the tenets of cognitive flexibility theory.

Summary

In response to the legal and ethical impetus of an increasing number of students with disabilities entering the postsecondary domain, administrators and program developers are challenged to make their campuses physically and academically accessible (Dalke, 1991; Gajar, 1992; Woods et al., 1990). There is undeniable empirical support that faculty training is an integral component of campus disability service programs

(Gajar, 1992; Houck et al., 1992; Morris et al., 1987; Rose, 1993; Smith & Nelson, 1993). In fact, in a master's research project recently completed at the University of Florida, the majority of students with disabilities who responded to the survey regarding use of services and recommendations, indicated that faculty training was an area of great need (Horowitz, 1994) at the university.

Modes of intervention that are typically recommended to facilitate faculty knowledge include faculty handbooks, support program newsletters, information bulletins, and open houses (Dalke, 1991). However, there is a gap in research pertinent to identifying which specific components of service delivery programs are effective in enhancing the success of students with disabilities in higher education settings (Nelson, & Lignugaris/Kraft, 1989) and even less research regarding the success of specific modes of training interventions for faculty (Kroeger & Schuck, 1993). There is a scarcity of research that would lead one to conclude that any of these methodologies is more effective in enhancing knowledge regarding students with disabilities by university faculty. Further, as resources for training interventions dwindle in postsecondary environments, the use of self-paced modules and computer technology gains in popularity as a training modality (Barr, 1978). The self-paced instructional module is particularly effective for disseminating and applying factual information (Barr, 1978), and the use of multimedia technology serves to enhance the capability of computerized, self-paced modules.

Multimedia technology as a training modality is based upon the tenets of cognitive flexibility theory. Learners are active participants in the acquisition of information and are able to direct their learning path contingent upon individual needs. The multidimensional nature of hypermedia technology offers a learner a flexible environment through the incorporation of authentic learning opportunities. The use of

case-based information can facilitate the extrapolation of learning material outside of the training environment.

There is little empirical study related to the effectiveness of computer technology to enhance faculty knowledge of students with disabilities in higher education settings. In fact, empirical investigation related to the effectiveness of multimedia as a training modality in any domain is a relatively new phenomena. The use of hypermedia to enhance faculty awareness of disability issues is the logical next step in identifying optimum service delivery components of higher education programs.

Important in assessing a particular modality's effectiveness is the implementation of a rigidly controlled experimental design. A pretest-posttest format is ideally suited to address the threats to validity and reliability that permeate research endeavors (Borg & Gall, 1989). The research reviewed in this chapter provides the foundation for further empirical investigation. This analysis undeniably affirms that faculty training related to students with disabilities is important in higher education settings. Using an experimental methodology can be the means for determining whether multimedia can be used as the vehicle for this training.

The theoretical and empirical discussion evident in this chapter indicated that faculty training in higher education settings does positively impact upon knowledge and attitudes. Ultimately, students with disabilities are positively affected by a campus environment that is characterized by communication and the dissemination of accurate information. The promise of multimedia technology as a vehicle to facilitate a cooperative campus climate is the basis for this research.

Chapter 3 contains a description of the specific methodology that will be used to assess the effectiveness of multimedia as a training intervention. The process and procedures utilized in any experimental design are important considerations for the

interpretation of study results. The statistical analyses completed to address the research hypothesis will either confirm or refute the effectiveness of the multimedia intervention as a training tool to enhance faculty knowledge of students with disabilities in postsecondary educational settings.

CHAPTER 3 METHODS AND PROCEDURES

Introduction

Chapter 3 presents a review of the methods and procedures that were used in this study. The components of this chapter include the description of the null hypothesis, the description of the pilot study, the description of the subjects, the description of the research instrumentation, the description of the procedure, and the treatment of the data.

Description of the Null Hypothesis

The null hypothesis was tested at the .05 level of confidence. Based upon probability theory and historical data (Cowles & Davis, 1982), this figure represents a rejection level of two times the standard deviation under the normal distribution. The probability of obtaining a particular result by chance is less than 5%. The risk of a Type I error, or the risk of rejecting a true null hypothesis, is 1 in 20. Since this study did not impose any life-threatening experimental interventions upon subjects, and the adverse effects of a false positive decision regarding the null hypothesis are minimal, the choice of a more stringent significance level was not warranted. The primary research question is expressed through the following null hypothesis:

H1: There is no statistically significant difference between the mean scores of the treatment and control groups in knowledge of issues related to students with disabilities in higher education.

The primary question in this investigation focused upon which specific training intervention is most effective in enhancing faculty knowledge of students with

disabilities. The literature reviewed in Chapter 2 clearly demonstrated that the presentation of information to faculty regarding disability issues enhances knowledge. Thus this investigation did not attempt to address the question of whether training, in a general sense, is effective in enhancing knowledge. Rather it was the intent of this research, as depicted in the description of the null hypothesis, to address the question of modality effectiveness. Consequently, as reflected in the primary question and the experimental design, a subject group that receives no inservice education was not used. The control group in this study is the group that received the traditional training intervention, the faculty handbook.

Additional research questions for this study are expressed through the following null hypotheses:

- H2: There is no statistically significant difference between the mean scores of the treatment and control groups in faculty satisfaction with the modality as a staff development tool.
- H3: There is no statistically significant difference between the mean scores of the treatment and control groups in faculty perceptions regarding the modality as a future staff development tool.
- H4: There is no statistically significant difference between the mean scores of the treatment and control groups in time necessary to complete the training modules.

Null Hypothesis #2 addressed personal satisfaction ratings by study respondents. This hypothesis sought to identify any differences between the two groups based upon perceptions associated with the use of a particular modality as a training tool. Conversely, null hypothesis #3 addressed whether there was any significant difference between the two groups regarding the modality's or tool's applicability for future training.

It is conceivable that respondents could be very satisfied with a particular training tool, yet perceive that it has no future application for staff development. In contrast, respondents could indicate a low degree of personal satisfaction with a particular training tool, yet perceive that it has great applicability for future staff development endeavors.

Further questions may be warranted based upon sample demographics. Previous empirical studies regarding this issue have addressed questions such as the impact upon faculty knowledge of the following factors: gender, professional discipline, years of teaching experience, and prior experience teaching students with disabilities. These questions can be addressed through descriptive analysis and inferential analysis.

However, the results regarding these variables may be difficult to generalize outside of the research study because of the small number of subjects represented in each demographic category and the voluntary nature of subject participation in the study. Additionally, through open-ended questions posed to respondents, subjective comments related to aspects of satisfaction, including strengths and weaknesses of the training modalities, were ascertained that can lead to future empirical investigation. In order to ensure that the established process was sound, a pilot study transpired prior to the actual research, including a review of the materials by panel experts.

Description of the Pilot Study

The pilot phase included a review of the survey instruments and the training modalities by a panel of experts as well as an analysis of the procedures that would be used in the research design. The pilot study provided information that facilitated data-collection techniques used in this investigation and offered suggestions regarding the revision of the pretest-posttest measures (Borg & Gall, 1989). As a result of the pilot phase, questions on the survey instruments were amended in terms of wording and grammar. Several questions were reworded to enhance readability by respondents.

Content of the staff development modalities was reviewed by both the pilot study participants and the panel of experts. Several areas were modified based upon the recommendations of the experts. In several instances, resource information was found to be inaccurate and was amended based upon the suggestions of reviewers. Further, color and graphic features associated with the multimedia intervention were changed based upon the recommendations of the reviewers.

The pilot study allowed for an assessment of the research process. This led to the development of further questions, such as the addition of the question related to time of completion. Respondents in the pilot study expressed through open-ended questions that one of the positive aspects of the multimedia intervention was the efficiency of the training modality. This led to the addition of the research question pertinent to time of completion that was incorporated into the overall investigation. Additionally, the rigorous implementation of the experimental design during the pilot study led to the development of ideas regarding how to better implement the study to ensure reliable and valid findings. The procedure established for this investigation, whereby a research associate would deliver either the computer-based multimedia method or the faculty handbook method to the respondent and sit with them during the training exercise, was deemed appropriate. The researcher could be available to answer questions that the subjects posed pertinent to the operation of either modality. The availability of the research associate to answer questions during the implementation of the interventions was especially important if the subject was not familiar with computer technology. Based upon the expressed anxiety of several of the pilot study subjects regarding the use of the laptop computer in the multimedia intervention, directions to subjects were amended to include admonitions that there was no way that subjects could harm the computer system or software. Additionally, during the pilot study it was learned that not

all faculty have experience using a mouse with a Microsoft Windows interface. Thus when directions were presented to subjects in the actual study, written and verbal instructions were included as well as demonstration regarding the use of a mouse as a means of moving around in the multimedia training intervention.

The process whereby subjects were asked to complete the posttest survey instrument while the research associate waited for its completion was also deemed appropriate. Pilot study subjects expressed that they preferred to complete the survey immediately following the training intervention while the information was still fresh in their minds and the possibility would not exist for the instrument to be lost. The completion of the posttest instrument immediately following either the multimedia or faculty handbook interventions ensured that the survey was completed and analysis could transpire since pretest and posttest data were available for each subject. When queried regarding the effect of the presence of this researcher during the intervention phase, pilot study subjects did not express any concerns. Conversely, subjects expressed that they felt more comfortable knowing that someone could assist them with the computer technology if necessary.

During the pilot phase of this study, a panel of experts was selected to provide information regarding the content validity and reliability of the two types of training interventions. As will be discussed in the research instrumentation section of this chapter, it was necessary to establish content validity and reliability of the pretest and posttest instruments. The original instrument upon which the pretest and posttest instruments were based was modified to address information unique to the University of Florida. A description of the panel of experts is indicated in appendix D. The panel members utilized a checklist (Appendix E) to record their perceptions regarding whether both training modules contained the same material. Descriptive analysis, using chi-

square frequencies with Statistical Analysis Software (SAS), was completed based upon the reviewers' frequency of responses on the checklist to ensure that the two measures reflect similar content. On 38 of the 41 item checklist, reviewers agreed that each of the content areas was reflected in each of the modalities. Based upon discussion with the reviewers, the three items that resulted in differing perceptions regarding whether they were covered in each of the modalities (27, 39, 41) were based on differing interpretations of the questions posed in the checklist. The high degree of agreement between reviewers led to the conclusion that the multimedia modality and the traditional handbook modality each contained the same content, satisfying the tenets of content validity. Thus in the actual study, a significant difference between the means of the two groups can lead one to conclude that the difference is based upon the differing methodologies utilized, as opposed to differing topical content of the training tools.

Additionally, this panel of experts was asked to assess the internal-consistency reliability of the pretest and posttest measures. Appendix F contains the reliability checklist utilized by the panel of experts to ensure that the assessment instrument is not biased toward any one of the two training modules. Each member of the panel was asked to provide feedback regarding both the multimedia and handbook interventions through completion of a checklist. Since the checklist is based on dichotomously scored items, a Kuder Richardson-20 coefficient to measure internal reliability of the pretest-posttest instrument was calculated (Crocker & Algina, 1986), rather than the traditional Cronbach's Alpha measure. This calculation, using Quatro Pro statistical software, was completed in order to ensure internal consistency of the evaluative instruments. The faculty handbook modality resulted in a reliability coefficient of .84, while the multimedia modality resulted in a reliability coefficient of .87.

Description of the Subjects

Before the selection of subjects, approval was secured from the University of Florida Institutional Review Board (UFIRB). The subjects in this study were randomly selected from the 1993-1994 University of Florida Campus Directory (News and Public Affairs Department, 1993). This is a directory published annually by the News and Public Affairs Department at the University of Florida. The Directory is a resource that contains faculty, student, staff, and department telephone listings alphabetically and is disseminated to all University of Florida affiliates.

Initially, a flyer was mailed to 300 faculty members chosen randomly using a linear systematic sampling technique (Pedhazur & Schmelkin, 1991). Every 10th name contained in the Campus directory constituted the initial sampling pool. Out of the 851 faculty who were identified in this initial pool, every third was selected for the initial research sample. Faculty ranks consisted of professor emeritus, professor, associate professor, assistant professor, adjunct professor, instructor, associate instructor, lecturer, program assistant, visiting professor, visiting assistant professor, visiting lecturer, and visiting instructor. Demographic information pertinent to this initial sampling pool is contained in Table 3-1.

The initial flyer mailed to the 300 faculty members contained information regarding the intent of the current research and served as a means of sparking interest in participation in the study. Appendix G contains the "hot news" flyer initially disseminated. Based upon the random sampling technique that was used to identify this initial sampling pool, subjects typified the general demographics of university faculty evident at the University of Florida.

Table 3-1. Demographics of Randomly Selected 300 Faculty Members for Initial Mailing. Data Represents Actual Number of Subjects by Category and Percentage of Entire Sample

Gender		Professional Rank	Professional Discipline/ College Affiliation		
Male	246 (82%)	Prof. Emeritus	9 (3%)	Agric.	54 (18%)
Female	54 (18%)	Professor	150 (50%)	Arch.	12 (4%)
		Assoc. Prof.	69 (23%)	Bus.	21 (7%)
		Asst. Prof.	33 (11%)	Educ.	12 (4%)
		Adj. Prof.	06 (2%)	Eng.	36 (12%)
		Instructor	03 (1%)	Fine Arts	06 (2%)
		Assoc. Instructor	06 (2%)	Health/HP	12 (4%)
		Asst. Instructor	12 (4%)	HRP	03 (1%)
		Lecturer	06 (2%)	J&C	04 (1%)
		Program Asst.	01	Law	10 (3%)
		Visiting Prof.	01	LAS	90 (30%)
		Visiting Asst. Prof.	03 (1%)	Medicine	27 (9%)
		Visiting Lecturer	01	Nursing	06 (2%)
		Visiting Instructor	-	Pharm.	06 (2%)
				Vet. Med.	04 (1%)

In order to ensure the representativeness of this initial sample to the general population of faculty at the University of Florida, the University of Florida Fact Book (Office of Academic Affairs, 1994) was used to obtain data regarding the demographics at this university. The University Fact Book is published by the Office of Academic Affairs for the purpose of providing an organized and authoritative source of information regarding some of the operations at the University of Florida. Sections of the guide focus upon university enrollment, degrees, grades, and attrition, faculty staffing patterns, loads and salaries, physical facilities, and fiscal analysis.

At the University of Florida in the Fall 1993, the total number of tenured and non-tenured faculty was reported to be 3,249. The number of males in this figure was 2,548, with the total percentage of university male faculty at 78%. Female faculty members represented 22% of this population. Thus the sample of 300 faculty members who were randomly selected to receive the pretest instrument obtained for this study is approximately representative of the university data and is indicated by a sample that consisted of 82% male and 18% female.

In this study, the professional rank of professor constituted 50% of the initial sample. In the Fall 1993, the ratio of the number of tenured and non-tenured faculty ranked as professor to the total faculty population was 1,077 to 3,249, or approximately, 33%. The total population of university faculty used in this calculation reported by the university does not include clinical titles, and titles of dean and above. Conversely, the randomly sampled subjects in this research included the rank of professor emeritus and clinical titles, thus this could explain the disparity between the number of subjects ranked as professor in this study (50%) and the figure reported by the university (33%).

Finally, the demographics in the initial sampling pool of this study associated with professional discipline indicated that one third of the sample (30%) are based in the College of Liberal Arts & Sciences. This would appear to be representative of the

university setting since the College of Liberal Arts & Sciences enrolls the largest number of students at the University of Florida, offers more academic majors and disciplines than any of the other 15 colleges on this campus, and is characterized by the greatest number of F.T.E. instructional units (518.11 of the total 2,947.94).

The second step of the sampling process entailed mailing an introductory letter and initial survey to all 300 faculty members with more detailed information regarding the nature of the study and the phases of the research process. Appendix C contains the introductory correspondence mailed to the sample pool. Additionally, the introductory letter invited faculty to participate in the research and explained that upon receipt of the returned survey they would be visited by this researcher and would be given the training materials necessary to complete the research. Subjects were asked to indicate whether they had experience with PC-based hardware or MacIntosh systems. This information can be important for future application of the multimedia training module and can be used to decide what technological equipment would be most accessible to university faculty.

Although for the purposes of this experimental design the initial survey served as a pretest measure, the instrument was identified as a survey or questionnaire in all communication and correspondence with research subjects. The decision to title the instrument a survey rather than a knowledge test is based upon the expected uneasiness that faculty would experience and possible resistance expressed related to the completion of a test (Harris, 1989). Included in the initial mailing was a demographic questionnaire (Appendix C). Questions pertinent to the respondents' gender, rank, professional discipline, years of teaching experience, and experience teaching students with disabilities were posed. This information was valuable in gaining descriptive information regarding the subjects who participated in the interventions as well as enabling the

completion of inferential analyses regarding the relation between these variables and knowledge of students with disabilities. The demographic information regarding the faculty subjects from the initial sampling pool of 300 who returned the completed survey are detailed in the forthcoming section.

Following the initial mailing, 99 responses were received. This represents a response rate of 33%. The purpose of this initial mailing was to identify a sample of respondents that would be interested in proceeding to the next step of the research process that included the actual completion of the intervention. There were no plans to use the data and information in the initial survey for analysis or inference. Only the pretest data from those subjects that were selected for the second step of the research, those that actually were interviewed and received either the experimental or control interventions, was considered in the final analysis of the research questions. Discussion with personnel from the faculty support center on the university campus indicated that there is no typical response rate at the University of Florida to faculty survey research. Response rates are impacted by the nature of the study and the purpose of the research. However, a response rate of 33% further highlights the delimiting nature of using the returned pretest surveys to identify a representative sample for the training modalities. The individuals who did take the time to complete the pretest instrument could possibly be more interested in the topic of the research or the research intentions. They may have a higher level of interest and thus would be motivated to a greater degree to participate in faculty development exercises. Although Table 3-2 demonstrates this sample's representativeness of the general university population of faculty, because the research entailed voluntary participation, there is no way to assess the impact that the voluntary

nature of this study had on the representativeness of the sample or upon the eventual effects of the training interventions.

Although 99 faculty members returned the completed pretest instrument, only 74 of these were considered usable for the purposes of the research intervention. Reasons for why 25 out of 99 responses were deemed inappropriate for inclusion in the intervention sample are as follows. Seventeen of the surveys were returned uncompleted with explanation that the subjects were either retired, on sabbatical, no longer at the university, in an administrative capacity with no teaching opportunity, or they were involved in teaching duties at sites other than the University of Florida, Gainesville Campus. Only three out of the 25 indicated that they were not interested in participating in the second step of the research, although two of these subjects took time to complete the initial survey. Additionally, five of the completed surveys returned did not indicate an identification number on the instrument, thus there was no way to identify the respondent for the purposes of arranging an interview to proceed with the intervention phase of the research. A description of the sample of 74 respondents who returned surveys that were deemed usable for the intervention phase of this research is detailed in Table 3-2.

A systematic sampling procedure (Pedhazér & Schmelkin, 1991) was utilized to place respondents in either the control or experimental groups, whereby the letters M (multimedia intervention) and T (traditional faculty handbook intervention) were placed in a container. When the appointment date was scheduled, a letter was picked from the container to indicate which one of the two training methodologies would be presented to the respondent. The specific modality or tool that would serve as the intervention was indicated on top of the survey.

Table 3-2. Demographics of Sample of Returned Surveys Deemed Usable for the Second Step of the Research Process. Numbers Indicate Actual Completed Pretest Surveys Received

Gender		Rank		Professional Discipline/ College Affiliation		Years of Experience	
Male	55 (74%)	Prof. Emeritus	03	Agric.	14	1-3 Years	04
Female	19 (26%)	Professor	40	Arch.	07	4-7 Years	14
		Assoc. Prof.	13	Bus.	02	8-10 Years	02
		Asst. Prof.	08	Educ.	05	11 or more	54
		Adj. Prof.	00	Eng.	08		
		Instructor	00	Fine Arts	02		
		Assoc. Inst.	02	Health/HP	05		
		Asst. Inst.	03	HRP	00		
		Lecturer	04	J&C	02		
		Program Asst.	01	Law	03		
		Visiting Prof.	-	CLAS	15		
		Vtg. Asst. Prof.	00	Medicine	05		
		Vtg. Lecturer	-	Nursing	02		
		Vtg. Inst.	-	Pharm.	01		
				Vet. Med.	02		
				Other/Mil. Sci.	01		
Exp. teaching students with disabilities			Yes	No	No answer		
			55 (74%)	16 (22%)	03 (4%)		
Access to computer hardware			PC	MAC	Both	Neither	
			46 (62%)	14 (19%)	08 (11%)	06 (8%)	

Each day telephone contact was attempted with the faculty members who had returned the pretest instrument. The purpose of the contact was to arrange a mutually convenient appointment time when one of the two training interventions would be brought to the faculty member's office and the intervention would be completed. The date and time of day of the attempted telephone contact was indicated on top of the pretest questionnaire. In order to arrange appointments with some of the subjects who eventually were included in the final sample, as many as five telephone attempts were made to some subjects before an appointment was made. The time of day that the telephone contact was attempted was helpful in narrowing the hours in which the faculty member could have office hours. Telephone contact times were intentionally varied for each subject to enhance the possibility of successfully getting through to the faculty member and arranging a convenient appointment.

Once telephone contact was made with the faculty member who returned the completed pretest instrument, on all but two occasions subjects were receptive toward arranging an appointment to complete the intervention phase of this research. The assurance that the visit would take only approximately 20 minutes, in all likelihood enhanced the subjects' receptiveness toward meeting with the research associate. Subjects were informed that all faculty development materials would be presented to them and their participation in this research would end at the conclusion of the 20-minute appointment. They were all assured that their names would be kept confidential. Appointments were scheduled with 42 faculty within a 5-week period to complete the training interventions.

The demographics of the final sample of subjects that received the multimedia or faculty handbook interventions is indicated in Table 4-1 and is contained in Chapter 4. The samples are representative of the diversity of faculty on the college campus regarding gender, years of teaching experience, and professional discipline. This can be assessed with a review of the demographic information provided by the respondents on the pretest instrument and tabulated in Table 4-1.

The total number of subjects included in this study was 42. The experimental group (those subjects who completed the multimedia training) and the control group (those subjects who completed the traditional training intervention) each contained 21 subjects. The number of subjects required in each group was determined using a set of theoretical considerations (Borg & Gall, 1989). The considerations postulated by Borg and Gall that impact upon the number of subjects in a sample focus upon the expected impact of uncontrolled variables, the impact of erroneously rejecting the null hypothesis (Type I error), and the number of subjects used in comparable empirical undertakings. The forthcoming discussion addresses these considerations.

It was not expected that there would be an enormity of uncontrolled variables that would adversely impact upon research results, hence the subjects in each group were expected to be representative of the overall population of faculty at the University of Florida, although the voluntary nature of participation in the study by university faculty is a delimitation that adversely impacts upon the sample's representativeness. Additionally, the choice of the .05 significance level, discussed in the first section of this chapter, does not necessitate an extremely large sample to reduce the probability of a Type I error (Borg & Gall, 1989). In a review of comparable research that examined the

effectiveness of multimedia as a learning intervention, sample sizes for the experimental groups (groups receiving multimedia intervention) varied considerably. The variability of the sample size is evident; 13 (Bain, Houghton, Sah, & Carroll, 1992); 30 (Lanza & Roselli, 1991); and 39 (Quade, 1993). An average of these figures results in a sample size of 27. However, since it was not expected that there would be a high attrition rate and experimental research suggests a minimum of 15 subjects in each group (Borg & Gall, 1989), the figure of 21 was selected as the sample size for each of the groups in this design. This procedure maintained the integrity of the research and ensured that the risk of an Alpha error (Type I error: rejection of the null hypothesis when it is correct) was minimal.

Description of the Research Instrumentation

Assessment

A pretest-posttest format was used to assess the levels of knowledge of university faculty regarding disability issues as they relate to students at the University of Florida. As discussed in forthcoming sections of this chapter, the assessment instrument was modified contingent upon whether it was used as the pretest or posttest measure. Both instruments were based upon a scale developed by Aksamit et al. (1987) at the University of Nebraska. Originally, this scale was a component of a questionnaire that was implemented to assess attitudes and knowledge held by university faculty toward students with learning disabilities. Appendix B contains the original scale utilized by these researchers. This scale was modified to be consistent with the training material covered in both the multimedia and handbook interventions. Further, the questions were

expanded to include students across disability categories, not just students with learning disabilities as was the focus of the initial instrument.

The modified pretest instrument is contained in Appendix C. This survey includes a section for demographic information that enabled a more descriptive analysis of the sample to transpire. Content validity was originally established on the initial scale using a panel of experts. Further, internal consistency reliability of the instrument was assessed at .82 using a Cronbach's Alpha coefficient (Aksamit et al., 1987). However, because the instrument was modified and in order to ensure a high level of content validity, namely that the assessment instrument accurately reflected the content of the training interventions, a panel of experts was utilized in the pilot study to assess content validity. As was detailed in the previous section of this chapter, descriptive analysis was completed to ascertain the frequency of responses by panel experts related to the validity of the assessment instrument in measuring the content of each of the training modalities. This analysis yielded a high degree of consistency expressed by experts regarding the content reflected in each of the training interventions. Additionally, using the reliability checklist contained in Appendix F, a Kuder Richardson-20 Alpha coefficient for dichotomously scored assessment instruments was calculated to ensure the reliability and internal consistency of the questions on the assessment instrument. The results of this analysis yielded a reliability coefficient of .84 for the faculty handbook intervention and .87 for the multimedia intervention. These figures are actually higher than the original figures reported by Aksamit et al. in their 1987 study.

The assessment instrument was constructed using a comprehensive procedure to facilitate validity and reliability. The forthcoming discussion addresses these steps:

1. define objectives
 2. define the target population
 3. review related measures
 4. develop an item pool
 5. prepare a prototype
 6. evaluate the prototype
- (Borg & Gall, 1989)

The objective of the research instrumentation as the pretest was to minimize the effect of preexisting knowledge of disability issues held by subjects that would confound results associated with the training interventions. Thus the pretest served as the covariate measure in the subsequent inferential analysis that transpired. Baseline data was obtained that was used to make evaluative inferences regarding modality effectiveness in facilitating faculty knowledge. Second, the target population was selected through random methodology as was previously discussed. The assessment measure contained an easy to read format and instructional information (Babbie, 1990) where necessary to reduce ambiguity in question response. Although the target sample of the questionnaire is university faculty, it is important to consider the readability of any assessment instrument (Babbie, 1990). A readability index will also ensure that the pretest and posttest instruments are commensurate in terms of readability, further reinforcing the content validity of the assessment instruments.

The *Flesch Reading Ease* and *Flesch Grade Level* scales were calculated using the features of the software, Microsoft Word. The *Flesch Grade Reading Ease* is an index ranging from 0 to 100, based upon the average number of words per sentence and syllables per word. The higher the number, the easier a document is to read. The value for standard text is approximately 60-70, which corresponds to a *Flesch Grade Level* of 7-8. The score for the pretest-posttest instrument in this research undertaking is 45.1.

This figure corresponds to a grade level of 13.7. The *Flesch Grade Level* uses the same criteria as the reading ease measure; however, it is expressed as a school grade level.

Standard writing has a value of understood by a person who has completed 7-8 years of education. The importance of these readability measures is grounded in survey research theory that recommends that questionnaires be written to make sense to respondents in order to be useful (Babbie, 1990). Further, this information is important to ensure that the readability of both the pretest and posttest instruments are the same. In this case, the scores are the same, thus the risk of error based upon differences in the readability of the assessment measures is reduced.

The distinction between the pretest-posttest measure is the addition of open-ended questions in the posttest instrument. Faculty were asked these subjective questions regarding their perceptions pertinent to the use of the specific training modality or training tool. This open-ended format takes the place of the demographic section that was contained in the pretest assessment instrument. The inclusion of subjective information in the results of this study can enhance discussion regarding study results through the identification of specific information, as opposed to relying on a Likert-type scaling instrument. Further, this information will be useful in modifying and refining the training methodologies for future research.

In a review of studies related to assessing faculty knowledge of disability issues in higher education, an assessment measure could not be identified that was appropriate for this research intervention. The content specific nature of the training intervention necessitated that the assessment tools be commensurate with the material covered in the intervention. The question item pool selected considered content validity measured by

the congruence between assessment questions and training interventions. As was indicated in the pilot study section of this chapter, the accuracy of these questions in measuring knowledge of disability issues in higher education was reviewed by a panel of experts.

The final step recommended by Borg and Gall (1989) is the development of a prototype. A preliminary assessment instrument was developed and a pilot study was conducted to ensure its optimal use in the experimental situation. Based upon suggestions presented by the reviewers and comments expressed by pilot study participants, the instruments were modified. Questions were reworded, a question pertinent to time of completion was added and grammatical errors were corrected.

The analysis of this instrument by the experts during the pilot study provided statistical evidence to ensure that the tenets of content validity were upheld. It is important that the training interventions contain the same material and the assessment instruments accurately reflect the content of the training interventions. As was previously discussed, suggestions and recommendations offered by the experts were considered and modifications to the assessment instrument were made.

The final assessment instrument consisted of 15 questions to which subjects could respond by circling an answer using a Likert-type rating scale. The posttest instrument is contained in appendix C. The Likert-type scale used ratings of 1 to 4: *strongly disagree* (1), *disagree* (2), *agree* (3), *agree strongly* (4). Higher scores reflected positive ratings, whereas lower scores reflected less positive ratings, or negative responses. The highest possible score on the either of the instruments was 60. The scale system that was utilized was modified from the original scale (Aksamit et al., 1987). A section was provided that

enabled participants to answer open-ended questions designed to gather subjective comments regarding training modality and personal impressions. This information is particularly useful for modification and future administration of the training intervention. These subjective comments and discussion of these findings are contained in Chapter 4.

Training Plan

Prior to the implementation of the experimental and control interventions, a session plan, as supported by Harris (1989), was developed to ensure that time frame and procedural issues would not disrupt the training process or compromise the results obtained. The plan that was identified and implemented is as follows:

1. Statement of problem: This is comprehensively discussed in Chapter 1 and is the basis of the research undertaking. This information was provided to study participants in a modified format through the introductory letter. Appendix C contains this initial correspondence.

2. Client specified: The target population is discussed in the first section of this chapter. Participants were informed regarding the way faculty were selected as the target sample and were apprised as to how the selection process transpired.

3. Goals and objectives: The goals and objectives of this research are detailed in Chapter 1. Subjects were provided with limited information regarding the desired outcomes.

4. Schedule of events: A detailed flowchart of the time frames anticipated to complete this research endeavor is particularly helpful in organizing information and planning for training interventions. Appendix H contains the time-plan that was used.

5. Description of procedures: The procedures important in this research intervention are detailed in the flowchart (Appendix H). The procedures utilized by subjects to complete the training interventions are incorporated in each of the training modules.

6. Evaluation: The overall effectiveness of the multimedia training versus the traditional training interventions is discussed in Chapter 4 of this study.

7. Follow-up plans: Recommendations for further study and implications of the training interventions are discussed in Chapter 5.

8. Exhibits: A detailed list of the materials needed to conduct this research was generated. Collaboration with experts in the field of computing and educational technology facilitated the selection of the multimedia software used to develop the experimental intervention. Appendix I contains the list of materials that were utilized as well as a description of the commercial software package that was used to develop the multimedia training intervention.

Training Model

The information that was used to develop the multimedia and handbook training interventions was abstracted from an array of sources (Dalke, 1991; Gajar et al., 1993; Jarrow, 1991; Rothstein, 1991a; Satcher, 1992b). However, the University of Florida Faculty Guide (Osfield, 1993), currently being used as the campus training tool, served as the major resource in the development of the training modules. Information was abstracted from these resources pertinent to legislation, specific disability groups, faculty-student interactions, classroom modification, pedagogical modifications, and resource and service information. The addition of questions regarding specific

accommodations and services to the original assessment instrument (Aksamit et al., 1987), was included in response to some of the objections that were raised regarding the over-encompassing nature of attitude surveys. As was discussed in Chapter 2, without reference to specific disability conditions, generalizations can lead to stereotypes (Rose, 1993). The over-generalization of the questions may not result in subject responses that are indicative of their true knowledge of disability issues.

The faculty handbook that was developed was used as the control group intervention. The information was presented in a linear fashion with little graphical representation of text information. A copy of the faculty handbook is contained in Appendix J. Conversely, based upon the tenets of cognitive flexibility theory, as detailed in Chapter 2, the multimedia training intervention contained this same descriptive information; however, it was formatted in an interactional framework that enabled the learner to be an active participant in the training process. The learner was expected to make decisions when answering questions that utilized the branching capabilities of the multimedia technology. Information was presented in a variety of contextual formats, that is consistent with the multidimensional nature of cognitive flexibility theory. The format enabled the learners to use authentic learning situations to respond to questions posed in the training module. Immediate feedback was given to the subjects based upon their response to the questions presented.

In order to ensure the consistency of the two training interventions, a reviewer checklist was completed by each member of the panel of experts for both the multimedia and handbook interventions. From this data, descriptive frequency analyses was completed to ensure the congruency of the training modules. As was discussed, there

were only three items on the 41-item reliability checklist that were not consistently expressed by reviewers as being a component of the training interventions. Follow-up discussion with the experts indicated that this discrepancy could have been based upon the ambiguity of the questions posed in the reliability instrument, rather than reflect any differences in perceptions regarding that particular content are was covered in the modalities. Ultimately, if the differences identified between subject pretest and posttest scores are deemed significant between these two training modalities, this difference can be attributed to the treatment intervention, rather than to any difference in content between the two interventions. The scores obtained will represent true differences among the knowledge level of subjects and can be said to be a result of the training intervention.

A comprehensive interactive training program was developed using the PC-based Lotus Freelance Graphics Software package distributed by the Lotus Corporation. Specific attention was paid to the length of the training program intervention. Faculty often experience frustration regarding the demands placed upon their time. They must balance the push of an academic setting for research endeavors with extracurricular programs (McCarthy & Campbell, 1993). A question regarding the time that it took for subjects to complete the training module was included in the posttest survey to ascertain whether there was any statistically significant difference between administration time of the multimedia versus traditional faculty handbook interventions.

The training program was copied to a PC compatible Toshiba Laptop computer owned by this investigator. This laptop was transported to each of the subjects in the experimental group (multimedia intervention) during a pre-scheduled appointment time.

Additionally, subjects in the control group were given the faculty handbook to be completed during a pre-scheduled appointment time. Subjects completed the training module in the privacy of their offices, with no time constraints placed upon the amount of time available to complete the training module. Appendix K contains a sample of the graphics and text that were observed by the learner in the actual training session. The research associate waited for the subjects to complete the training interventions during the scheduled office appointment.

Description of the Procedures

Research Design

A 2x2, pretest-posttest experimental design was utilized to test the hypothesis. Through random selection of the initial subject pool and ultimate voluntary participation by subjects, subjects were randomly placed in either the experimental or control groups. The independent variable in this undertaking is represented by the type of training intervention completed by study participants. Twenty-one subjects received the multimedia training intervention and 21 subjects completed the traditional training intervention (the faculty handbook) which represents the control group.

The research question sought to determine which specific training intervention was most effective in enhancing faculty knowledge of students with disabilities. The question did not address whether training is effective, since an enormity of empirical evidence exists that affirmatively answers this question (Aksamit et al., 1987; Baggett, 1993; Edwards, 1992; Houck et al., 1992; Leyser, 1989; Nelson et al., 1990; Satcher, 1992b; Smith & Nelson, 1993; Woods et al., 1990). The effectiveness of multimedia as opposed to a traditional training intervention is the basis of the primary research question.

The dependent variable for the primary research question was the faculty member's score on the posttest knowledge survey instrument. The posttest measure reflects the change in knowledge level of faculty members as a result of the training intervention, whether it be the multimedia or traditional methodologies. Table 3-3 depicts a schematic representation of the experimental design.

Table 3-3. Schematic Representation of the Experimental Design

R	O_1	X_1	O_2
R	O_1	X_2	O_2

R = random assignment to experimental and control groups
 O_1 = pretest measure
 X_1 = Multimedia treatment-training intervention; X_2 traditional faculty handbook treatment-training intervention
 O_2 = posttest measure

Setting

The training interventions were completed on an individual basis during a pre-scheduled appointment time arranged at the convenience of the study participants. Instructions to participants included how to use the multimedia intervention and the hardware provided to them. Additional instructions requested that subjects provide honest feedback regarding their perceptions of the training tool as faculty development modality. The verbal instructions presented to study participants in both the experimental and control groups complemented the instructions that were detailed in the cover letters accompanying the pretest survey instrument. There was no discussion before the subject completed the intervention regarding the alternate modality being assessed during the study.

Following the subject's completion of one of the training modules, more detailed information was provided regarding the nature of the study, including the alternate methodology being evaluated. Subjects were informed that information regarding the outcomes of the assessment of the methodologies would be available at a later date and would be disseminated to those who participated.

Materials

Both the technology-based training package and the faculty handbook training package were delivered to participants during the scheduled appointment time. Thus there were no additional materials necessary for the intervention phase of the research. Since instructions were provided to each participant during this appointment, no previous knowledge regarding the use of a laptop computer was necessary before the intervention.

Instrument Administration

The pretest survey was completed independently by each study participant. A pre-addressed envelope was provided with the initial survey to facilitate response rates. The demographic data associated with those subjects who completed the pretest instrument and returned it was previously discussed and is detailed in Table 3-2.

The second step of the research entailed an attempt to schedule an interview time with each participant that would provide the venue for the completion of one of the two training methodologies. In some cases, it took more than five telephone attempts at varying times during the week and day to contact the subject to arrange the appointment. All 74 of the respondents who had returned the pretest instrument deemed usable were considered for the second phase of the research, thus attempts to contact the subjects by telephone were made.

Appointments were arranged with 42 of the subjects who had responded to the initial survey. The purpose of the visit was to present one of the two training interventions to the faculty subjects while the researcher waited. Based upon whether the subject was assigned to the experimental or the control group, the faculty member was given either a laptop computer containing the multimedia training intervention or a faculty handbook. Subjects were asked to complete the training modality during the scheduled appointment time, although no time restrictions were placed on completion of the module. Complete instructions regarding how to use the laptop computer for the multimedia intervention were presented to subjects in the experimental group through written and verbal instructions and demonstration.

When the subjects had completed either the multimedia or faculty handbook interventions, they were asked to complete the posttest questionnaire provided to them at the time of the appointment. Participants were encouraged to provide honest feedback regarding their perceptions of the particular modality as a faculty development tool. On only two occasions did subjects indicate that they preferred to complete the posttest survey at a later time. These two posttest questionnaires were subsequently mailed to the researcher within a 2-day period. Participants were given a thank-you note following their completion of the posttest survey and were informed that results and analyses of the training interventions would be forwarded to all participants at a later date.

Treatment of the Data

Descriptive and inferential statistics were employed in this study. All data analysis utilized the integrated computerized program of Statistical Analysis Software (SAS) to generate summative and inferential information. In order to organize and interpret

findings, graphical representation of the data was used. Chapter 4 contains detailed information regarding the analysis of data and the specific research findings for the sample of 42 faculty who received either the experimental or control interventions.

Descriptive statistics were obtained including the mean and standard deviation of both the control group and experimental groups. Inferential statistics using an analysis of covariance (ANCOVA) was carried out in order to address the first hypothesis pertinent to faculty knowledge of students with disabilities. All inferential analyses utilized the significance level of .05. The choice of this significance level is detailed in the first section of this chapter.

Analyses of statistical differences between the experimental and control groups for research questions two through four utilized analysis of variance (ANOVA) calculations. The target of these questions related to personal satisfaction of the subjects with the modality as a training intervention, perceived applicability of the training modality as a future faculty development tool, and whether there was a statistical difference in the time necessary to complete the modules between the multimedia and control group interventions.

The parametric test of statistical significance chosen for the primary research question regarding faculty knowledge is the analysis of covariance (ANCOVA). The linear model of the analysis tool is represented in Table 3-4. The pretest measurement in the design serves as the covariate to remove the effect of prior knowledge that faculty members held regarding issues pertinent to students with disabilities. Additionally, utilizing a pretest eliminates the validity threats that can confound results such as history, maturation, and testing. The effect of the ANCOVA results in an adjusted posttest score

that is indicative of the true impact of the training intervention, as opposed to any preexisting knowledge that subjects may have had before the intervention. The covariate removes systematic differences among subjects from the within groups error term.

Table 3-4. Linear Model of the ANCOVA

$$Y_{pi} = \mu + \alpha_i + \varepsilon_{pi}$$

$$Y_{pi(adj)} = Y_{pi} - \beta_w (\bar{x}_{pi} - \bar{x}_G)$$

Where

Y_{pi}	= the unadjusted dependent variable score (score on knowledge survey) for subject p in treatment level i
μ	= the overall population mean
α_i	= the effect of the treatment, whether it be the multimedia training or the traditional training
β_w	= regression coefficient for covariate
$\bar{x}_{pi} - \bar{x}_G$	= the covariate score for subject p in treatment level i - the covariate sample mean
ε_{pi}	= random error
$Y_{pi(adj)}$	= the adjusted dependent variable score (score on knowledge survey) for subject p in treatment level i

Using an ANCOVA analysis is a more powerful statistical tool than a one-way analysis of variance statistical tool because of the removal of some of the variability within the groups, thus the total error variance is reduced. The design requirements of the fixed-effects ANCOVA are satisfied in this study in that there is one independent variable with two or more levels, a covariate is measured prior to the implementation of the treatment and control conditions, and the subjects were randomly assigned to either the treatment or control groups (Shavelson, 1988).

Inferences regarding the impact of such variables as gender, professional discipline, years of teaching experience, and prior teaching experience with students with

disabilities, to the general population of faculty at the University of Florida must be done with the knowledge that each of these demographic categories contains a small number of subjects. However, descriptive analyses of these demographic variables provides further information regarding the nature of the sample and lays the groundwork for future research undertakings.

Summary

Chapter 3 identified the methods and procedures that were utilized in this research. The primary research question is addressed through the following null hypothesis: There will be no statistically significant difference between the mean scores of the treatment and control groups in knowledge of issues related to students with disabilities. The primary research question resides around the issue regarding what modality is most effective in enhancing faculty knowledge. Empirical studies indicated that faculty training is effective in enhancing knowledge, thus the question remains, which training is most effective?

Secondary questions relate to affective perceptions of the subject regarding satisfaction with the modality and perceptions regarding the modality as a future staff development tool. A final hypothesis is related to the statistical difference between the training modalities in the time necessary to complete the intervention.

To gain information regarding the reliability and validity of the research instrumentation, a pilot study was conducted including a panel of experts. Subjects were randomly selected for the pilot study. Subjects who were selected for inclusion on the panel possessed experience in disability related issues and higher education. Content validity of the training modules was ascertained using a checklist completed by panel

experts. Chi-square frequency analyses using Statistical Analysis Software (SAS) indicated that there was a high degree of congruence between the information contained in the multimedia and faculty handbook interventions. Additionally, in order to ensure the content validity-reliability between the two modes of training intervention and the assessment instruments, a reviewer checklist was completed by the panel members. A Kuder-Richardson-20 Coefficient for dichotomously scored items was found to be .84 for the faculty handbook intervention and .87 for the multimedia intervention.

The subjects included in the pilot study were not included in the sample that was ultimately selected for the actual study. However, the subjective comments received by the pilot study participants was important for the refinement of the actual study. The information presented by these participants led to modifications of the pretest-posttest instruments, the training interventions, and the process by which this research was implemented.

Using the University of Florida Directory, 300 faculty members were selected using a linear systematic sampling technique. Due to the random nature of the initial subject pool, faculty subjects were expected to be representative of the general population of faculty at the University of Florida. This is confirmed through an analysis of the initial sampling pool and is detailed in Table 3-1 of this chapter. Each of these 300 subjects were mailed a flyer deemed "hot news" in order to spark interest in the forthcoming research.

One week following the mailing of the flyer, an initial mailing was sent to the same 300 subjects who were initially randomly selected. A demographic sheet, an introductory letter, the pretest survey, and a return envelope was included in this correspondence.

Subjects were requested to complete the survey and return it within a one-week period. Ninety-nine surveys were received, although only 74 of these were deemed appropriate for the next step of the research process. Faculty who voluntarily chose not to participate, faculty who were retired or on sabbatical, faculty who did not work in close proximity to the University of Florida, and those faculty who did not include an identification number on their pretest surveys were not considered for the final sample for the intervention phase of the research.

Once assured that the stringent guidelines associated with validity and reliability were established, the training intervention was initiated. Telephone contacts were attempted with each of the 74 respondents in order to make an appointment for the subject to complete one of the interventions. Subjects were placed in either the experimental (multimedia training) or control (traditional faculty handbook training) groups, using a random sampling technique. When an appointment was made with a faculty member a letter coinciding with the training modality was drawn from a container. The specific modality that would serve as the intervention was indicated at the top of the completed instrument.

During a scheduled interview time, this researcher provided the subjects with either a laptop computer containing the multimedia intervention or the faculty handbook representing the traditional or control group intervention. Participants were provided with directions and demonstration when necessary and were encouraged to provide honest feedback regarding the particular modality as a faculty development tool. When the faculty subjects completed review of the training materials, they were presented with a posttest survey to be completed during the scheduled appointment time. At the

conclusion of the appointment, a thank-you note was presented to the participant along with verbal information regarding the research intentions. Subjects were assured that they would receive a follow-up letter regarding the outcomes and analyses of the study at a future date.

A pretest-posttest control group design was used to carry out the research questions regarding modality effectiveness in facilitating faculty knowledge of students with disabilities. Using the Statistical Analysis Software (SAS) package, descriptive and inferential analyses were completed. The analysis of covariance (ANCOVA) was used as the statistical tool in the primary research question, allowing the pretest to serve as the covariate to remove some of the within group variance, based upon pre-existing knowledge of disability issues held by faculty subjects. The covariate analysis is a powerful statistical tool that enables the total error variance associated with the training intervention to be reduced. An analysis of variance statistical methodology was used to address the research questions related to satisfaction levels, perceptions regarding the modality as a training tool, and time required to complete the intervention.

Qualitative inquiry was accomplished through the inclusion of open-ended questions in the posttest assessment instrument. Respondents were queried regarding the specific facets of the methodology that they liked the most and those features that they did not like. To complement research question 3, perceptions regarding the modality's effectiveness as a future staff development tool, subjects were asked what characteristics of the medium they believed to be most effective as a training tool and those features that they perceived to be ineffective. The comments presented by subjects are included in

Chapter 4 and complement the quantitative analysis that transpired. The subjective comments offered by participants can also be useful for future research endeavors.

Chapter 4 will contain the quantitative and qualitative findings of the study and will include graphic representation of data to complement the narrative discussion. A discussion regarding the impact of descriptive information such as gender, professional discipline, years of teaching experience, and prior experience teaching students with disabilities will raise questions and issues that can be used as the basis for future research endeavors. This emphasis sets the foundation for the research recommendations and implications that are discussed in Chapter 5.

CHAPTER 4

RESULTS

In Chapter 4, the results of the effectiveness of a multimedia faculty development intervention versus a traditional handbook intervention are presented. The chapter is organized to present the findings associated with each of the questions posed in Chapter 1, which were formulated into null hypotheses as described in Chapter 3. In all of these sections, the results associated with the quantitative descriptive and inferential analyses are discussed and include graphical representation of the data. All numerical analysis utilized the latest version of Statistical Analysis Software (SAS) with a .05 level of significance selected as the criterion for rejecting the null hypothesis.

This chapter includes results pertinent to the open-ended questions posed to respondents on the posttest assessment instrument. This qualitative and descriptive information will complement the results obtained through quantitative analysis for each section. The small number of subjects in each group ($n=21$) allowed for the assessment of this data by hand using categories of descriptors to facilitate organization. The qualitative analysis in this chapter does not include any information pertinent to observations made by this researcher or comments presented by respondents during the post-intervention discussion and interview. Instead, the observational and interview data will be presented in the interpretations and implications chapter, Chapter 5.

Summary of Demographic Information

Table 3-1 contained in Chapter 3, described the original sample of 300 faculty that were randomly selected as possible participants in the research intervention. The demographics table associated with the usable sample of 74 subjects who returned the completed pretest instrument and who were considered for the next phase of the research process is also contained in Chapter 3, Table 3-2. It was the intent of both of these graphical depictions to demonstrate the representativeness of the faculty subjects to the general population of University faculty at the University of Florida, despite the voluntary nature of subject participation in the study.

Table 4-1, described below, is a descriptive analysis of the demographics of the final sample of 42 faculty members who actually received either the multimedia or faculty handbook interventions. Again, the percentage of subjects according to gender and professional rank who participated in the intervention phase are commensurate with the overall demographics of the University of Florida. Further, although the sample size is relatively small ($n=42$) in comparison the total number of university faculty (3,249), the data pertinent to demographic category of college affiliation or professional discipline is commensurate with the population demographics at the university. More subjects from the College of Liberal Arts & Sciences are included in this sample (9), which is consistent with the fact that this is the largest college at the University.

Gender

Seventy-four percent of the total number of subjects who were included in the final sample were male, while 26% were female. In Fall 1993, the University Fact Book

Table 4-1. Demographics of Final Sample: Data Reported is Actual Subjects by Group

GENDER		RANK			PROFESSIONAL DISCIPLINE/ COLLEGE AFFILIATION				
M/T	M/T		M/T		M/T		M/T		M/T
Male	Female	Prof. Emeritus	00 / 00	Asst. Instructor	02 / 01	Agric.	02 / 06	HRP	00 / 00
14 / 17	07 / 04	Professor	12 / 11	Lecturer	02 / 04	Arch.	02 / 02	J&C	00 / 00
		Assoc. Prof.	02 / 02	Program Asst.	00 / 00	Bus.	01 / 01	Law	02 / 00
		Asst. Prof.	02 / 02	Visiting Prof.	00 / 00	Educ.	02 / 01	CLAS	03 / 06
		Adj. Prof.	00 / 00	Vtg Asst. Prof.	00 / 00	Eng.	02 / 02	Medicine	03 / 00
		Instructor	00 / 00	Visiting Lecturer	00 / 00	Fine Arts	00 / 00	Nursing	01 / 00
		Assoc. Instructor	01 / 01	Vtg Instructor	00 / 00	Health/HP	02 / 02	Pharm.	00 / 00
								Vet. Med.	01 / 01

Years/teaching experience			
Multimedia		Traditional	
1-3 years	02	01	
4-7 years	04	02	
8-10 years	01	0	
10 or more	14	18	

M = Multimedia Intervention Group

T = Traditional Handbook Intervention Group

(Office of Academic Affairs, 1994) indicated that the female to total faculty ratio at the university was 701 to 3,249, or approximately, 22%. In this study, the number of males represented in the sample is slightly lower than the 78% figure reported by the University in Fall 1993, with females being more represented. However, the figure indicated by the University Fact Book does not include clinical titles, whereas the sample in this study did not discount these faculty members from the sample. Further, the University Fact Book (1994) data indicated that there was missing information regarding the reporting of gender, which may result in a higher reported figure if those non-respondents were accounted for. Finally, the demographic information obtained from the university is based upon 1993 statistics. It is conceivable that the number of female faculty members on this campus has risen throughout the preceding 2-year period, thus explaining the higher percentage of females identified in this sample. With these considerations, the gender distribution identified in this undertaking would appear representative of the gender distribution of faculty members at the University of Florida.

The mean scores of faculty members who received either the experimental or control interventions are contained in Table 4-2.

Table 4-2. Mean Scores of Knowledge for Study Participants by Group and Gender

	Multimedia		Traditional	
	Pretest	Posttest	Pretest	Posttest
Males (n=31)	32.57	43.85	32.65	46.47
Females (n=11)	35.43	50.29	33.25	45.50

The largest increase in posttest scores was evident for females in the multimedia group (+14.86 points). Males in the multimedia intervention group realized the lowest point increase (+11.28); however, in both interventions, overall mean score in the male group was slightly lower on the pretest instrument than their female colleagues. The small number of subjects in each of the training interventions, especially the female group, must be considered in interpreting these results and generalizing the findings outside of this study.

Rank, Professional Discipline and Years of Teaching Experience

In the final sample, 55% of the subjects reported their faculty rank to be professor. The Fall 1993 data published in the University Fact Book (1994) indicated that the number of tenured and non-tenured faculty members ranked as professor was 33%. Although the number of faculty members ranked as professor who ultimately volunteered to participate in this research is higher (55%) in the current study, the figure presented by the University in Fall 1993 does not include some clinical titles, whereas the random sampling procedure utilized in this undertaking did not differentiate between clinical and non-clinical titles of respondents. Further, the demographics associated with professional rank of faculty members on this campus could have changed slightly since Fall 1993.

With the largest number of faculty on the University of Florida campus affiliated with the College of Liberal Arts and Sciences (CLAS), it is not surprising to see that 9 of the subjects of the total sample of 42 respondents reported to be in an academic discipline within this College. This figure represents 21% of the total sample of subjects who received one of the two training interventions. The lack of respondents in the final sample who reported their discipline as being within the College of Fine Arts, College of

Health Related Professions, College of Journalism & Communications, or Pharmacy is indicative of the small number of faculty within these colleges at the University of Florida. Due to the small sample sizes in each professional discipline category, for example, only 2 respondents in the College of Business and 1 affiliated with the College of Nursing, it is difficult to make inferences regarding professional discipline and its impact upon knowledge levels of faculty pertinent to students with disabilities.

In the final sample, 76% or 32 out of the total sample of 42 subjects indicated that they had 10 or more years of teaching experience. No distinction was made regarding whether this experience was exclusively at the University of Florida. This figure is consistent with the previously reported figure of respondents who indicated that they held the faculty rank of professor (55%), since one would expect that to achieve the rank of professor more college teaching experience was necessary. An analysis of the impact of number of years of teaching experience is difficult due to the small number of respondents in the final sample who represent each time-group category.

Experience Teaching Students with Disabilities

Table 4-3 details the descriptive information pertinent to prior experience teaching students with disabilities and training intervention.

Table 4-3. Descriptive Data for Study Participants: Experience Teaching Students with Disabilities by Group

	Multimedia (n=21)	Traditional (n=21)	TOTAL (n=42)
Prior experience	16 (76%)	19 (90%)	35 (83%)
No prior experience	05 (24%)	02 (10%)	07 (17%)

As indicated by this descriptive information, 83% of the final sample reported that they had prior experience teaching students with disabilities. This is confirmed through

the verbal discussions that transpired during the interviews subsequent to the respondents completion of the training interventions. Faculty subjects were eager to discuss with this researcher their personal experiences regarding the students that they have had in their classes.

Interestingly, more subjects in the traditional training group reported that they had prior experience teaching students with disabilities than those subjects in the multimedia intervention group. This distinction, 90% in the traditional group versus 76% in the multimedia group, prompted this investigator to analyze whether the differences in prior experiences of the two groups could have ultimately impacted the acquisition of knowledge levels. Descriptive data for this analysis is contained in Table 4-4.

Table 4-4. Mean Scores of Knowledge for Study Participants by Previous Experience Teaching Students with Disabilities and Group

		Pretest		Posttest	
		Mean	SD	Mean	SD
MULTIMEDIA (n=21)	Prior experience with students with disabilities	33.63	4.71	46.63	4.81
	No prior experience	33.20	4.82	44.00	8.46
TRADITIONAL (n=21)	Prior experience with students with disabilities	33.00	8.50	46.68	11.27
	No experience	30.50	2.12	42.50	.70

As indicated by these data, those faculty members who received the multimedia intervention and who reported previous teaching experience with students with disabilities had a mean score of 33.63 on the pretest instrument and a mean score of 46.63 on the posttest instrument. This represents a positive change of 13 points on the

60-point Likert-type instrument. Conversely, those respondents in the traditional intervention group scored an average of 33.00 points on the pretest instrument and a mean of 46.68 points on the posttest instrument. This represents an increase of 13.68 points.

Variance of the scores differed greatly among the two treatment groups for both those subjects who reported previous experience teaching students with disabilities and those subjects who indicated that they had no experience. The sharpest disparity identified is for those subjects in the traditional group who reported prior experience teaching students with disabilities. The standard deviation for this segment of the sample was 11.27 points on an assessment instrument with a possible total number of points being 60. The variability among the scores in this segment as compared to the posttest standard deviation score identified in the multimedia, prior experience group (4.81 points), is almost three times as great.

An analysis of variance statistical methodology was used to ascertain whether there was any significant difference between the means of posttest scores based upon prior experience teaching students with disabilities as reported by respondents. Table 4-5 details this analysis.

Table 4-5. Results of Analysis of Variance for Knowledge by Previous Experience Teaching Students with Disabilities

Source of Variation	Sum of Squares	df	Mean Square	F
Main Effect (Group)	55.54	1	55.54	.76
Residual (Error)	2923.60	40	73.09	
Total	2979.14	41		

There was no significant difference found in mean knowledge scores of subjects based upon previous experience teaching students with disabilities ($F(1, 40) = .76; p > .05$). Although subjects in the traditional group reported more experience teaching students with disabilities (90%) than did their colleagues in the multimedia group (76%), this difference did not significantly impact upon posttest knowledge scores as assessed by the analysis of variance.

To determine whether respondents' prior experiences teaching students with disabilities and the independent variable of group had a significant impact upon posttest knowledge scores, further inferential analysis transpired using analysis of variance (ANOVA) as the statistical tool. Data related to this analysis is contained in Table 4-6.

Table 4-6. Results of Analysis of Variance for Knowledge by Previous Experience Teaching Students with Disabilities and Group

Source of Variance	Sum of Squares	df	Mean Square	F-Value
Covariate (pretest)	1219.76	1	1219.76	26.54 *
Main Effects				
Group	2.22	1	2.22	.05
Previous Experience	23.10	1	23.10	.50
2-Way Interactions				
Group x Previous Exp.	.041	1	.041	.00
Explained	1278.55	4	319.64	6.95
Residual	1700.59	37	45.96	
Total	2979.14	42	70.93	

* Significant at .05

Based upon review of this data, the only significant difference found in knowledge scores of subjects based upon group and previous experience teaching students with

disabilities is in the covariate, or pretest ($F(1, 37)=26.54$; $p<.05$). An analysis of the interaction effect between previous experience teaching students with disabilities and group indicated that there was no significant difference found between the mean scores based upon previous experience and group ($F(1, 37)=0$; $p>.05$). However, the mean scores associated with the covariate, which considered the subject's prior knowledge before the intervention, did have a significant impact upon posttest knowledge scores.

Access to Computer Hardware

On the pretest instrument, subjects were asked to indicate whether they had access to PC-based hardware, MacIntosh-based hardware, both systems, or neither. Table 4-7 details the actual number and percentage of respondents in each category.

Table 4-7. Descriptive Data for Study Participants: Access to Computer Hardware by Group

		Multimedia (n=21)	Traditional (n=21)	TOTAL
Access to hardware	PC	15 (71%)	13 (62%)	28 (67%)
	MAC	04 (19%)	06 (29%)	10 (24%)
	Both	02 (10%)	00	02 (5%)
	Neither	00	02 (10%)	02 (5%)

The availability of computer hardware for faculty members on the University of Florida campus will be particularly important for future research endeavors and recommendations regarding ongoing faculty training interventions. The hardware utilized in this research was PC-based. However, the laptop computer utilized and the Windows interface that was part of the multimedia application are commensurate with the features of both PC-based and MacIntosh-based systems. Further, instructions and demonstration were provided to study participants, therefore the procurement of

information regarding accessibility to computer hardware was for the exclusive purpose of consideration for future research endeavors.

Research Question #1

Research question 1, or the primary research question in this undertaking, addressed whether faculty knowledge of issues related to students with disabilities would differ on a posttest instrument based upon whether the subjects received a multimedia intervention (experimental group) or traditional handbook intervention (control group). This question was addressed through the following null hypothesis: There is no statistically significant difference between the mean scores of the treatment and control groups in knowledge of issues related to students with disabilities in higher education.

In order to answer this question, descriptive statistics were calculated and analyzed and are graphically depicted in Table 4-8.

Table 4-8. Mean Scores of Knowledge for Study Participants by Group

Group	Pretest		Posttest		Change in score
	Mean	SD	Mean	SD	
Experimental (Multimedia) (n=21)	33.52	4.62	46.00	5.74	+12.5
Control (Traditional) (n=21)	32.76	8.10	46.29	10.77	+13.5

As indicated by this data, faculty subjects in the experimental group, those who received the multimedia intervention, scored higher on the pretest instrument (33.52) than those subjects in the control group (32.76). This score is based on a 15-item Likert-type instrument, with each question worth a possible four points. The total possible score

on the instrument is 60 points, with this number representing a high degree of knowledge of issues pertinent students with disabilities. However, on the posttest instrument, subjects who received the multimedia training scored lower (46.0) than those subjects who had received the control group intervention (46.28). Consistent with this finding, is the greater increase of mean subject scores from pretest to posttest in the control group intervention. Although the mean scores for both groups increased from pretest to posttest, this difference was greater in the control group, evidenced by a 13.5 point increase versus a 12.5 point increase evident in the experimental group.

Also evident through analysis of this descriptive data is the fact that the control group, or those subjects who received the traditional faculty handbook intervention, exhibited greater variance in their scores on both the pretest and posttest measures than those subjects who received the experimental intervention (multimedia). Subjects in the control group presented a wider range of high and low scores and greater variability on the 60-point assessment instrument than did those subjects in the experimental group.

To identify whether a statistical difference could be identified between the means of the groups based upon treatment interventions, an analysis of covariance (ANCOVA) statistical methodology was utilized. Table 4-9 depicts the empirical results of this analysis.

The null hypothesis for the primary research question was not rejected, indicating that there was no statistically significant difference between the mean scores of the experimental and control groups on knowledge of issues related to students with disabilities in higher education based upon group ($F(1, 39) = .20; p > .05$). Although the mean scores for both groups increased, there was no statistically significant difference

found based upon whether subjects received the multimedia or traditional handbook intervention.

Table 4-9. Results of Analysis of Covariance for Knowledge of Issues Related to Students with Disabilities in Higher Education by Group

Source of Variation	Sum of Squares	df	Mean Square	F
Covariate _{adj.} (Pretest)	1250.33	1	1250.33	28.22 *
Main Effect _{adj.} (Group)	9.08	1	9.08	.20
Explained	1251.19	2	625.60	14.12
Residual	1727.95	39	44.30	
Total	2979.14	41	72.66	

* Significant at .05

Interestingly, although there was no statistical difference identified between mean scores based upon group, there was a significant difference identified based upon the covariate, or prior knowledge as measured by the pretest ($F(1, 39) = 28.22; p < .05$). The effect of the pretest, which served as the covariate, had a greater impact upon posttest knowledge scores than did completion of either of the training interventions (group).

Research Question #2

Research question 2 addressed faculty satisfaction with the one of the two training modalities as a staff development tool. This question was formulated into the following null hypothesis: There is no statistically significant difference between the mean scores of the treatment and control groups in faculty satisfaction with the modality as a staff development tool. A 4-point Likert-type scale was used to gather this information using the following categories; 1-Very Dissatisfied; 2- Dissatisfied; 3-Satisfied; 4-Very Satisfied. The percentage of respondents in each category is depicted in Table 4-10.

Table 4-10. Descriptive Data for Study Participants: Satisfaction with the Training Modality by Group

Group	Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied
Experimental (Multimedia) (n=21)	0	0	17%	33%
Control (Traditional) (n=21)	0	2%	31%	17%

Ninety-eight percent of the study participants in both groups indicated that they were either satisfied or very satisfied with the training interventions. Only one subject in the entire sample, representing 2% of the sample, indicated dissatisfaction with the training methodology.

An important finding is that those subjects in the experimental group (multimedia) were very satisfied to a greater degree (33%) than those respondents in the control group who indicated that they were very satisfied (17%). These figures are approximately reversed when evaluating the category of satisfied. More faculty in the traditional intervention group were satisfied (31%) versus 17% of subjects in the multimedia group who indicated they were satisfied. This is important because the category of very satisfied represents a higher degree of satisfaction with the training modality than does the category of satisfied. The finding that the percentage of subjects who indicated that they were very satisfied with the modality was higher in the experimental group as compared to the control group will impact upon the viability of this methodology as a staff development tool. These findings will be elaborated in Chapter 5.

Evidence that faculty were satisfied with the experimental intervention (multimedia) to a greater degree than faculty in the control group (traditional) is substantiated through a review of the means associated with reported satisfaction scores.

Table 4-11 depicts these results.

Table 4-11. Mean Scores of Reported Satisfaction Scores by Study Participants by Group: 1-Very Dissatisfied; 2-Dissatisfied; 3-Satisfied; 4: Very Satisfied

Group	Mean	SD
Experimental (Multimedia) (n=21)	3.67	.48
Control (Traditional) (n=21)	3.29	.56

To assess whether there was a statistically significant difference between the means of the satisfaction scores by group an analysis of variance (ANOVA) procedure was carried out. Table 4-12 details the results of this analysis.

Table 4-12. Results of Analysis of Variance for Reported Satisfaction Scores for Study Participants by Group

Source of Variation	Sum of Squares	df	Mean Square	F
Main Effect (Group)	1.52	1	1.52	5.57 *
Residual (Error)	10.9	40	.274	
Total	12.48	41		

* Significant at .05

The computation of the one-way ANOVA resulted in a significant difference in the overall mean scores of satisfaction levels by study participants ($F(1, 40)=5.57; p<.05$),

leading to rejection of the null hypothesis. This is consistent with the findings previously discussed regarding the disparity between the categories of satisfied and very satisfied reported by participants based upon group. The inferential analysis depicted by Table 4-12 is also substantiated by a review of the mean satisfaction scores reported by subjects, (experimental-3.67; control-3.29) that was previously detailed in Table 4-11.

In both the multimedia and traditional training groups, subjects were asked to respond to the following open-ended question: "What aspects of this modality did you like the most?" and "What aspects of this modality did you like the least?" In both groups, the predominant feature that subjects indicated they liked the most was the short, concise, and time-efficient manner in which the information could be presented. Responses reported by respondents that were common to both groups include simplicity and independent completion. In the multimedia group, two of the subjects indicated that they liked the quick feedback and self-directed pace that the interactive nature of the tool allowed. Subjects in the traditional group commented on the physical presentation of the material that facilitated readability and understanding.

Conversely, when queried regarding what aspects of the modality that they like the least, in both groups at least two subjects indicated that they disliked the fact that the modality was impersonal and that they could not discuss the information or ask questions. At least two subjects in the multimedia group reported that they disliked having to use a mouse and were uncomfortable with the laptop computer. Two respondents in the traditional group expressed that the modality did not contain enough detailed information regarding how to interact with students with disabilities and should contain more examples.

Research Question #3

Faculty were queried regarding their perceptions as to whether they believed that the particular training modality to which they were exposed has applicability as a future staff development tool. This question sought to identify whether subjects perceived that the modality could be used by others in the future. Respondents used a 4-point Likert-type scale, with the following categories: 1-No potential; 2-Little potential; 3-Some potential; and 4-Good potential. This question is reflected by the third null hypothesis: There is no statistically significant difference between the mean scores of the treatment and control groups in faculty perceptions regarding the modality as a future staff development tool. Descriptive data in the form of percentage of responses in each category is detailed in Table 4-13.

Table 4-13. Descriptive Data for Study Participants: Perceptions Regarding the Future Applicability of the Modality as a Staff Development Tool by Group

Group	No Potential	Little Potential	Some Potential	Good Potential
Experimental (Multimedia) (n=21)	0	0	7.1%	43%
Control (Traditional) (n=21)	0	0	9.5%	41%

More subjects in the multimedia group indicated that the training tool had good potential for future staff development (43%) than did subjects in the traditional group (41%). This finding is consistent with a review of the overall mean ratings presented by subjects and contained in Table 4-14.

Table 4-14. Mean Scores of Reported Perceptions By Study Participants Regarding the Training Modality as a Future Staff Development Tool by Group

Group	Mean	SD
Experimental (Multimedia) (n=21)	3.86	.36
Control (Traditional) (n=21)	3.81	.40

The overall mean score for those 21 respondents in the multimedia group was 3.86, whereas the overall mean score for the subjects in the traditional group was 3.81. Subjects in the experimental group perceived that the intervention had a slightly greater potential as a future staff development tool than did those subjects who received the control intervention. However, there was slightly more variability in the range of scores of subjects in the control group than was evident in the responses presented by subjects in the experimental group. To assess whether the differences between these means is statistically significant at the .05 confidence level, an analysis of variance (ANOVA) was completed. The results of this analysis are depicted in Table 4-15.

This analysis indicated that there was no statistical significance between the mean scores related to faculty perceptions of the methodology as a future staff development tool ($F(1, 40)=.16; p>.05$). Thus the null hypothesis was not rejected and it can be concluded that, based upon group, there was no statistical significance between the overall mean scores of the responses presented by subjects regarding the future viability of the training method as a staff development tool.

Table 4-15. Results of Analysis of Variance for Reported Perceptions for Study Participants Regarding the Modality as a Future Staff Development Tool by Group

Source of Variation	Sum of Squares	df	Mean Square	F
Main Effect (Group)	.024	1	.024	.16
Residual (Error)	5.81	40	.15	
Total	5.83	41		

Open-ended questions posed to subjects focused upon the effective and ineffective aspects of the training tool. Three respondents in the experimental group (multimedia) commented on the effectiveness of the question-answer, interactional feature that is associated with the multimedia technology. Further comments presented by those subjects who received the multimedia intervention are holds attention, flexibility, the use of case studies, and the self-regulated pace of the medium. Subjects in the traditional group indicated that the features that they found most effective were (a) can be easily disseminated, (b) the repetition of material facilitates memory, and (c) the use of pictures to support text.

When asked what aspects of the training modality they found to be ineffective, comments presented by subjects in the multimedia group focused on the difficulty or anxiety associated with using a computer and the difficulty that may arise to disseminate this mode of training. Subjects in the traditional group expressed that the ineffective aspects of this modality were no personal contact, the time necessary to read the material, and motivating faculty to read such a document.

Research Question #4

The final research question focused upon whether one methodology was more efficient to utilize by faculty subjects than the other method. This question was addressed in the following null hypothesis: There is no statistically significant difference between the mean scores of the treatment and control groups in time necessary to complete the training module. To ascertain this information, faculty subjects were asked to indicate the time that it took to complete the training module. This information was contained on the posttest assessment instrument. A description of the mean scores of the responses to this question is detailed in Table 4-16.

Table 4-16 Mean Scores of Reported Time Necessary to Complete the Training Modality By Study Participants

Group	Mean	SD
Experimental (Multimedia) (n=21)	12.5	3.4
Control (Traditional) (n=21)	12.2	5.2

Subjects in the experimental group (multimedia) took 12.5 minutes, on the average, to complete the training intervention, while those subjects in the control group (traditional) completed the training tool in approximately 12.2 minutes. There was greater variability in the time necessary to complete the training module among subjects in the control group (5.2 minutes versus 3.4 minutes). To assess whether there was any statistical significance between the mean scores of responses related to time necessary to

complete the module, an analysis of variance (ANOVA) was computed at the .05 significance level. Table 4-17 depicts this information.

Table 4-17. Results of Analysis of Variance for Reported Time Necessary to Complete the Training Module for Study Participants by Group

Source of Variation	Sum of Squares	df	Mean Square	F
Main Effect (Group)	.857	1	.857	.05
Residual (Error)	740.47	40	18.51	
Total	741.33	41		

A review of this analysis indicates that there is no statistical difference between the mean scores of time necessary to complete the training modules based upon group ($F(1, 40) = .05$; $p > .05$), thus the null hypothesis was not rejected. There is no statistically significant difference in time necessary to complete the training module for respondents in the experimental group versus those in the control group. Further discussion of this issue is presented in Chapter 5.

Summary

In Chapter 4, the results associated with the comparison of an interactive multimedia intervention versus a traditional handbook intervention in facilitating faculty knowledge of students with disabilities in a higher education setting are presented. Descriptive and inferential statistics were computed to ascertain whether there was a difference in knowledge levels possessed by faculty as a result of the completion of one of these two training methodologies. Secondary questions addressed included whether there was a significant difference in reported satisfaction levels between the two methodologies, whether there was a significant difference in reported perceptions

regarding the viability of the methodologies as a future staff development tools, and whether there was a significant difference in efficiency of use of the two modalities.

There was no statistical difference found between the two groups and knowledge on the posttest instrument. Although pretest and posttest mean scores of subjects did vary between the two groups, this difference was not found to be significant at the .05 confidence level. However, as measured by an analysis of covariance (ANCOVA) methodology, a statistical difference was identified based upon the pretest or the covariate measure. There was no statistical difference found based upon the mean scores associated with whether subjects had prior experience teaching students with disabilities and group. Consequently, the significant difference found in knowledge scores based upon the pretest measure warrants further interpretation. Explanation for this phenomenon will be included in Chapter 5.

A statistical difference was found between the two groups regarding reported satisfaction levels with the method as a training tool. Faculty subjects in the experimental group (multimedia) reported greater satisfaction levels associated with the use of the methodology than did those subjects in the control group (traditional). Conversely, there was no statistical difference identified either in faculty perceptions regarding the modality as a future staff development tool or the time necessary to complete the intervention, although descriptive analysis of this data does yield some variance of scores. This variance will be considered in forthcoming discussion.

The final chapter, Chapter 5, will contain a discussion related to these findings and will include the qualitative information that was generated by respondents through open-ended questions, observation, and a post-intervention interview. Interpretation and

explanation will accompany this discussion and will serve as the foundation for the recommendations for future research section that is at the conclusion of the chapter.

CHAPTER 5

DISCUSSION AND IMPLICATIONS

Initially, this chapter presents an overview of the purpose and objectives of this study, including a review of the research questions and null hypotheses that were the basis for statistical analysis. A review of the method used in the research process will facilitate understanding of the discussion in the interpretation of results section that is at the core of this chapter. Quantitative data and discussion and interpretation of results will be complemented with the qualitative information that was gleaned through open-ended questions, observation, and interviews with study participants. This information is important for the recommendations for future research section that is at the conclusion of this chapter.

Review of Study Purpose and Objectives

As more students with disabilities enroll in postsecondary institutions, ways of facilitating their success in the higher education setting becomes even more important. Programs, services, and the general campus climate are considered integral toward the retention of students with disabilities within postsecondary settings. Important elements of the campus environment are the university faculty and their knowledge of disability issues as they relate to the instructional process. Training and inservice education through the dissemination of written documentation and workshops are deemed effective in enhancing faculty knowledge of students with disabilities. An increase in knowledge leads to enhanced awareness and the presentation of more favorable attitudes by

university personnel. This climate is then conducive toward the retention and success of students with disabilities in the postsecondary setting.

It was the intent of this study to evaluate the effectiveness of two training modalities in facilitating faculty knowledge of issues pertinent to students with disabilities in a higher education setting. Specifically, a multimedia training intervention and faculty handbook intervention were developed and evaluated by study participants. The purpose of this assessment was to identify whether there was any significant difference in the means of posttest scores related to faculty knowledge of disability issues. Additional objectives of the experimental design included an assessment regarding whether there was any difference between the two modalities in subjects' perceptions regarding satisfaction of the method, subjects' perceptions regarding the tool as a future training methodology, and efficiency of use of the method.

Review of the Literature

Program planners and administrators have a responsibility to make their postsecondary campuses physically and academically accessible to students with disabilities. Empirical evidence purports that comprehensive programs facilitate the retention and success of students with disabilities in higher education settings. Integral to the comprehensive programs offered in postsecondary domains is faculty training regarding instructional modifications, legislative issues, and general disability issues. The presentation of information to faculty was demonstrated to increase knowledge and awareness and thereby increase the development of positive attitudes related to students with disabilities in the instructional process.

Faculty development planners in higher education typically utilize handbooks and other written materials to disseminate information regarding disability issues. However, a scarcity of research exists that examines the effectiveness of any training modality in facilitating faculty knowledge of students with disabilities. In other settings, multimedia technology is evaluated to identify whether its hypertext capabilities lead to greater understanding by learners of the subject matter presented using these technological tools.

The features of multimedia as a format for the delivery of training material are consistent with the tenets of cognitive flexibility theory. Characteristics such as the active involvement of the learner, the presentation of information in multidimensional formats, the authentic learning opportunities available, and the flexible presentation environment were empirically demonstrated to enhance the acquisition of information by the learner. Further, research demonstrated that transfer learning to situations outside of the learning environment and long-term learning are enhanced as a result of a training modality that incorporates the characteristics of cognitive flexibility theory.

Review of the Hypotheses

The research questions that are the basis for the null hypotheses tested in this study are included in this section.

1. Will the use of a multimedia training intervention or a traditional faculty handbook training modality result in a significant difference in faculty knowledge of issues related to students with disabilities in higher education settings?

Null Hypothesis #1: There is no statistically significant difference between the mean scores of the treatment and control groups in knowledge of issues related to students with disabilities in higher education.

2. Will the use of an interactive multimedia intervention or a traditional faculty handbook methodology result in a significant difference in faculty satisfaction with the modality as a staff development intervention?

Null Hypothesis #2: There is no statistically significant difference between the mean scores of the treatment and control groups in faculty satisfaction with the modality as a staff development tool.

3. Will the use of an interactive multimedia intervention or a traditional faculty handbook methodology result in a significant difference in faculty perceptions regarding the modality as a future staff development tool?

Null Hypothesis #3: There is no statistically significant difference between the mean scores of the treatment and control groups in faculty perceptions regarding the modality as a future staff development tool.

4. Will the use of an interactive multimedia intervention or a traditional faculty handbook methodology result in a significant difference in time necessary to complete the training modules?

Null Hypothesis #4: There is no statistically significant difference between the mean scores of the treatment and control groups in time necessary to complete the training modules.

Review of the Methods

An interactive multimedia training program using the PC-based Freelance Graphics Software was developed and loaded on to a laptop computer. The program was developed based upon the characteristics of cognitive flexibility and included branching features, the use of cases to represent authentic learning opportunities, graphic

representation of text when applicable, and flexibility in the presentation of information. The faculty handbook was developed and presented information in a linear fashion. Both modalities contained information pertinent to instructional modifications, legislative issues, and identification of resources.

A pilot study that included a panel of experts was completed prior to the implementation of the actual study. Panel experts agreed that the content of both the multimedia intervention and faculty handbook intervention was consistent. The assessment instrument used as the pretest and posttest measure was found to be reliable with both the multimedia and handbook interventions. Procedures associated with implementation of the study were amended based upon the recommendations of the pilot study participants.

A pretest and a demographic information sheet were disseminated to 300 randomly selected faculty at the University of Florida. The final sample of 42 subjects was based upon the respondents' completion of the pretest instrument and their willingness to schedule an interview with this researcher for the intervention phase of the study. At all times, the demographics of the sample were representative of the general population of faculty at the University of Florida.

During a scheduled interview, half of the sample of 42 faculty members completed the multimedia intervention and half the sample completed the faculty handbook intervention. Subjects were requested to complete the posttest survey during the scheduled appointment. Interview and observational data were also obtained during the appointment.

Summary of Research Findings

Findings indicated that the type of intervention to which a faculty member was exposed did not have any varying impact upon the acquisition of knowledge pertinent to disability issues. In both groups the posttest scores improved, substantiating the positive impact of inservice training of any type. Since there was no significant difference identified in the mean posttest knowledge score of subjects, the null hypothesis pertinent to the primary research question was not rejected.

Although one modality was not found to be any more effective than the other, higher satisfaction levels were reported by subjects in the multimedia group. The second null hypothesis was rejected indicating that there were differences in satisfaction levels reported by the two groups, with those subjects in the multimedia group indicating higher satisfaction ratings. This has important implications for program administrators and training planners in higher education settings.

In analyzing the results associated with research question #3, faculty perceptions regarding the modality as a future inservice tool, there was no statistically significant difference identified based upon whether the subjects were in the multimedia or traditional group. The qualitative explanations provided by respondents contributed to the analysis of this data. Finally, there was no difference in the time that the intervention took to complete, thus it does not appear that one method is any different in terms of efficiency of use. Hence, null hypothesis #4, related to time of completion, was not rejected.

Interpretation and Discussion of Results

This section is divided into an organizational schema that specifically addresses the interpretative results associated with the demographic data obtained as well as each of the four research questions. As evidenced by the forthcoming discussion, there is much overlap between the findings pertinent to each question. However, the discussion is complemented by reference to the qualitative component of this study obtained from open-ended questions, interview, and observation. This non-empirical information is helpful in substantiating interpretative discussion and serves to narrow the gap between discrepancies in quantitative findings.

Interpretation/Discussion of Results for Demographic Information

Findings associated with the analysis of the demographic information pertinent to the final sample of 42 subjects indicated that females in the experimental group (multimedia) did slightly better on the posttest instrument than did their male colleagues who had received the multimedia intervention. However, this figure is reversed in the sample of males and females who completed the traditional intervention. In all groups, regardless of gender, posttest scores increased, thereby substantiating the effectiveness of faculty training regardless of whether the intervention were in multimedia or written format.

The small number of respondents in each demographic category associated with rank, professional discipline, and years of teaching experience made the completion of inferential analysis difficult. However, the descriptive data provided does substantiate the sample's representativeness of the University of Florida population of faculty.

Interpretation/Discussion of Results for Previous Experience Teaching Students with Disabilities

In the final sample, 83% of the 42 subjects indicated that they had prior experience teaching students with disabilities. Previous research indicated that this experience is empirically demonstrated to have a positive impact upon knowledge of issues related to students with disabilities. In the traditional group, 90% of the subjects indicated that they had previous experience with students with disabilities, while 76% of those subjects in the multimedia group indicated that they had experience. However, this experience is not consistently evident in the pretest scores of these groups. Despite the rate of previous experience teaching students with disabilities reported by subjects in the traditional intervention group, the overall mean of the pretest scores of these respondents ($\mu=33.00$), was lower than the mean of the pretest scores of subjects in the multimedia group ($\mu=33.63$). Although this difference is slight and does not impact upon posttest knowledge scores as measured by the analysis of variance (ANOVA), ($F(1, 40)=.76$; $p>.05$), the results are contradictory to previous research findings.

Previous experience teaching students with disabilities can sensitize faculty members to disability related issues. This sensitization can be either positive or negative and is contingent upon the specific experience of the faculty member. The results of this sensitization may have been brought to the testing situation and were reflected in the pretest scores. This can explain the apparent conflicting results found between previous experience teaching students with disabilities and the pretest scores. Another explanation for this discrepancy may be explained by an effect caused by the treatment intervention or an adverse effect associated with the testing situation. This will be elaborated upon in the forthcoming discussion related to the results for the primary research question.

Interpretation/Discussion of Results for Research Question 1

There was no significant difference identified between the mean posttest scores of subjects based upon whether they received the experimental (multimedia) or control (traditional) interventions. Thus the null hypothesis was not rejected. It can be concluded that the multimedia intervention, despite its reliance upon the tenets of cognitive flexibility theory, had no greater impact upon enhancing the knowledge of faculty regarding students with disabilities than did the traditional handbook intervention. There are several explanations as to why this result may have occurred.

When the multimedia tool was brought to faculty members offices for the intervention, initial reaction and comments were observed. "Wow, you did this!", "This is great!", and "Wow, this is nice!" were some of the statements verbalized by respondents. Perhaps subjects in the experimental group, those faculty members who completed the multimedia intervention, were more attentive toward the technological aspects of the tool than they were with the content or material presented by the intervention. Although 95% of the sample indicated that they had access to either PC-based or MacIntosh-based computer hardware, perhaps they did not have previous experience with the sophistication of a multimedia, graphical application. This novelty effect may have adversely impacted upon the acquisition of knowledge by subjects in the multimedia intervention group.

It is apparent that multimedia as a training modality, with its hypertext capabilities, may not be a suitable tool for all learners. The branching capabilities of the multimedia intervention may have served as a distracter to some subjects. Verbal statements made by some respondents in the presence of this investigator included "Where do I go from

here?" and "What topic do I go to?" Observations of these subjects indicated that there was some anxiety associated with choosing the correct path in the hypertext program.

Another possible explanation for the non-significant findings associated with the modality's impact upon the acquisition of knowledge may be the subjects' greater interest in the mechanical aspects of the multimedia intervention. Although subjects were presented with verbal directions and demonstration regarding how to use a software application with a mouse, observations made by this researcher indicated that some subjects may not have been comfortable with the hardware. Comments such as "I can't get this thing to work" and "I can't get the pointer on the button" indicated that there was some user anxiety associated with using the equipment.

The implementation of the multimedia intervention during the pilot study revealed issues associated with user anxiety regarding the branching capabilities of the tool as well as the possible anxiety associated with using the hardware. Subsequently, directions to subjects in the actual study included admonitions that there is no one correct path and subjects should explore any topic they desired. Verbal directions regarding the operational aspects of the multimedia program were complemented with demonstration. However, the anxiety and uncertainty pertinent to the branching effect of the multimedia intervention as well as the mechanical operation of the tool may have adversely impacted upon a subject's full attention toward the content of the modality, thus negatively affecting posttest knowledge scores.

Another finding that can serve to explain the non-significant results between the two interventions is the high degree of variability that was evident in the control (traditional handbook) group. The standard deviation for this group was 8.10 points on

the pretest and 10.77 points on the posttest instrument. On a scale of a possible 60 points, an 11 point differentiation between subject scores is large. Subjects in the traditional group appeared to do either quite poorly or quite well, skewing the overall mean either positively or negatively. This inconsistency of scores is not reflected in the standard deviation scores of the multimedia group, where the figures on both the pretest and posttest instruments are approximately half of the standard deviation evident in the traditional group. The finding that subjects who completed the multimedia intervention scored on the average consistently better is important for faculty development planners in higher education.

With resources and time typically presented as obstacles toward inservice involvement, training planners must identify the most effective and efficient means of implementing staff development activities. If the acquisition of knowledge is more consistently demonstrated using one training modality over another, this would have important implications for reaching more faculty through inservice programs. Although some faculty using an opposing methodology may have learned more from the intervention, the fact that there is a wide disparity in the amount of knowledge acquired from the tool, in that some faculty learned a great deal less, must be considered. Cost-effectiveness of a training tool and its ultimate impact upon reaching the greatest number of faculty are important elements associated with choosing a particular training methodology.

The experimental and control interventions were completed by study participants during the presence of this research investigator. Directions to subjects preceding the intervention encouraged respondents to complete the training tool at their own pace and

emphasized that there would be no interaction between the subjects and this investigator during the intervention. However, there could have been a monitoring effect perceived by subjects that could have impacted upon results. Perhaps in the presence of this researcher subjects were distracted or not as attentive to the content of the training modalities as they would have been if they had completed the interventions on an independent basis.

Conversely, it is possible that the presence of this investigator during the intervention caused subjects to evaluate more seriously the content of the modalities. Verbal reports from subjects subsequent to the intervention indicated that they liked the personal contact that was a component of this research. Additionally, subjects voluntarily discussed their personal experiences with this researcher subsequent to the intervention and appeared to enjoy the personal interaction that transpired.

Although there was no significant difference identified in the posttest scores based upon group, a significant difference was identified based upon the pretest or covariate measure. The information contained in the pretest instrument served to enhance knowledge levels, although no feedback was given to the subjects regarding their performance on the pretest measure. Perhaps the ongoing presentation of information or the repetition of information sparked thought by subjects regarding the issues presented in the assessment instruments. They used the information contained on the pretest instrument to think about issues that previously would not have been considered. They used this information to their benefit when completing the posttest instrument thus increasing their overall knowledge scores of issues pertinent to students with disabilities.

Second, the covariate measure is reflective of a subject's prior knowledge of a subject before entering the research situation. The use of analysis of covariance (ANCOVA) is expected to consider this prior knowledge and adjust knowledge scores to ensure that all subjects are at the same level before the administration of a treatment intervention. Since this covariate did have an impact upon subsequent knowledge procurement by faculty subjects, one would wonder where they obtained this knowledge. The results of the previous experience teaching students with disabilities are inconsistent with the pretest variable, thus the acquisition of information by faculty is based on an alternate source. Perhaps faculty have utilized the numerous resources available at the university, such as the written publications and faculty guide, or they could have received this information outside of the university setting. Topics in the news pertinent to disability issues have been quite prevalent since the passage of the Americans with Disabilities Act (ADA) in 1990. It is conceivable that faculty are using these resources to supplement those resources available at the university. During some interviews, subjects expressed that they had relatives who had disabilities and this sparked their interest in disability issues as they pertain to students at the university. Future research in this area can address this issue, although the question related to the source of the acquisition of knowledge is not as important as the impact of this knowledge upon faculty interactions and instructional practices regarding students with disabilities.

Interpretation/Discussion of Results for Research Question 2

Study results indicated that 98% of the participants were either satisfied or very satisfied with the training interventions. An analysis of variance (ANOVA) indicated that there was a statistical significance identified in reported satisfaction levels of

respondents based upon group. Subjects in the multimedia group were more "very satisfied" (33%) than those subjects in the traditional group (17%). This finding is substantiated through an analysis of the mean scores pertinent to reported satisfaction levels, whereby subjects in the multimedia group had a mean score of 3.67, while those subjects in the traditional group reported a mean satisfaction of 3.29. These scores are based on a 4-point scale, with four being very satisfied.

Satisfaction is described as a motivational variable in facilitating active involvement in learning activities (Keller & Kopp, 1987). Keller described that learners can lose their motivation if the outcomes of their efforts are inconsistent with their expectations. Strategies that can be used to facilitate satisfaction levels include providing opportunities to apply acquired knowledge, providing positive feedback and reinforcers, and maintaining equity through consistent standards. The characteristics of the multimedia intervention appear commensurate with these strategies and can explain the higher reported satisfaction levels expressed by subjects in the experimental group.

The use of authentic learning opportunities, consistent with the cognitive flexibility theory, is the foundation for the use of multimedia. The opportunity to apply information and the use of cases was an integral component of the experimental intervention. Subjective comments expressed by respondents pertinent to the positive features associated with the intervention substantiate the importance of case-based and problem-solving scenarios in faculty development tools. Subjects commented, "I liked the question-answer format," "I liked the interaction," and "I liked the opportunity to apply the information".

Also important in facilitating learner motivation is the provision of positive feedback during the learning experience. The multimedia intervention was able to do this because of its branching capabilities. When a faculty member answered a question correctly, another screen would appear with the following message, "Great, this is the correct answer!" Observation of faculty by this researcher when a correct answer was made indicated that they were pleased with their efforts. These positive feelings were reflected in the following comments, "Yea, I got the right answer!" and "Wow, I was right!" This appeared to stimulate study participants to move on through the program with confidence that was not apparent in those subjects using the traditional handbook methodology. More verbal statements were made by those subjects in the multimedia group as opposed to those faculty in the traditional group. Faculty who used the handbook methodology appeared to read in a linear fashion and expressed no overt comments regarding the modality or their own performance.

The issue of cost-effectiveness is again considered in the analysis of reported satisfaction levels by subjects. With dwindling monetary resources in higher education, it is common sense to select training interventions that faculty and staff will use. If faculty are more satisfied with a particular modality than they are with another modality, they are apt to be motivated to use that tool with which they are more satisfied. With satisfaction highly related to motivation (Keller & Kopp, 1987), it is clear that satisfaction expressed by learners must be an important consideration in choosing training tools.

Interpretation/Discussion of Results for Research Question 3

Subjects were queried regarding their perceptions of the modality as a future staff development tool. This question sought to learn whether faculty believed that the training tool could be used by others for staff development purposes. Results showed that 100% of respondents in both groups indicated that the modules have some potential or good potential for future use as a training vehicle. Subjects in the multimedia intervention indicated that the tool had good potential to a slightly greater degree than did their colleagues in the traditional group. There was no statistically significant difference found related to perceptions for future applicability by group.

Subjective comments presented by subjects can offer an explanation as to why there was no statistical significance found between the two groups. Statements such as, "You can lead a camel to water but you can't make the camel drink," "It's hard to imagine people taking the time to do this unless there was a check off system imposed by a department chair," and "I think faculty and staff need more information. Unfortunately, they need to be prodded into using educational resources," reflect a general skepticism on the part of many faculty regarding continuing education and faculty development activities.

The time that faculty have to spend in non-instructional activities is limited. There is an effort to balance the instructional needs of students with the push for research that is expected in large, research-based institutions such as the University of Florida. Discussion with faculty subsequent to the intervention indicated that many of them use resources when they have to, such as when they learn that they have a student with a disability in one of their classes. However, with the expected increase in enrollment of

students with disabilities in higher education settings, the possibility of having a student with a disability in a particular class becomes even more realistic. The implementation of a viable training program pertinent to this topic is viewed as a proactive approach to addressing the particular needs of students, as opposed to a reactive approach, whereby the learner must scurry to identify resources.

Interpretation/Discussion of Results for Research Question 4

The available time that faculty have to spend in faculty development activities acts as a barrier toward voluntary participation. Thus the question was asked regarding efficiency of use of a particular modality. There was no statistical difference identified in the posttest knowledge scores based upon the training intervention. The overall mean time that it took both groups to complete the intervention was approximately 12 minutes. However, the control group did demonstrate a higher variance in their rates of completion than did those subjects in the multimedia group.

Through observation, this researcher noticed that at times subjects in the traditional intervention group appeared to scan pages of text rather than read the content in its entirety. Unless the subjects were accomplished in speed reading techniques, it did not appear that they were attending to all the information on a page and instead cursorily reviewed the material. Conversely, subjects in the multimedia group did appear to attend to all the information on a screen. Different color text and font sizes evident in the multimedia application highlighted different information. Graphics and pictures complemented the text when possible to compliment the narrative description. This appeared to hold the attention of participants in the multimedia group, as evidenced by observation of the subjects examining the graphic depictions.

Through open-ended questions, respondents expressed overwhelmingly, that one of the best features of both modalities was its efficiency. This highlights faculty concern with regard to time spent in activities outside of their instructional or research roles. However, the presence of this researcher during the intervention phase of the research could have been perceived by faculty as if they were being rushed to finish the training module. Explicit instructions were presented to subjects before the intervention that emphasized that they were not being timed and encouraged subjects to complete the module at their own pace. Subjects did not present any verbal statements to the researcher following the intervention that indicated that the presence of the researcher impacted upon their evaluation of the tool in anyway. In fact, subjects spent considerable time discussing the module and their personal experiences with the researcher, subsequent to the intervention.

Results Associated with Cognitive Flexibility Theory

The interactive multimedia faculty development modality incorporated the tenets of cognitive flexibility theory. The training program used features associated with random access instruction, nonlinear presentation of information, case-based instruction, and authentic learning to depict information pertinent to students with disabilities. The underlying rationale of cognitive flexibility theory is believed to have impacted upon the results in this analysis.

The hypertext capabilities of the multimedia tool allowed for random access instruction and learner control in the instructional process. Verbal statements presented by subjects subsequent to the intervention indicated that they liked the ability to become active participants in the learning process through the ability to choose a path of

instruction or direct the pace of learning. Subjects reported that they enjoyed making decisions in response to the interactional framework of the multimedia modality and expressed that they liked the graphic depiction of information to complement text.

Conversely, the nonlinear presentation of information and random access instruction capability inherent in the hypertext multimedia application could have distracted subjects. Perhaps subjects gave more thought as to where to go in the learning module or how fast to move throughout the module, as opposed to thinking about the specific content of the tool. This could explain why there was no significant difference identified between the two faculty development modalities on the acquisition of knowledge and why null hypothesis #1 failed to be rejected.

Subjects expressed satisfaction with the ability to solve problems through the use of case-based information and authentic learning opportunities. Results indicated that a significant difference existed between the two groups based upon satisfaction and led to the rejection of the null hypothesis #2. The realistic application of knowledge to varying situations is an important tenet underlying cognitive flexibility theory. These features are believed to have positively affected subjects' satisfaction with the interactive multimedia faculty development tool.

Problems and Limitations

The voluntary nature of the intervention sample and the small sample size, are considerations in generalizing the results of the study to the general population of faculty at the University of Florida. Perhaps, the faculty who responded to the survey and who agreed to meet with the researcher chose to participate because they had an interest in the topic. There may have been some motivational impetus that facilitated their

participation. All but three subjects who were contacted subsequent to receipt of their completed survey were willing to meet with the researcher to complete one of the interventions. The motivation expressed by these subjects sets them apart from the 66% of the initial sample of 300 subjects who did not respond to the pretest survey. This is a consideration not only for the ability to generalize the information but also for faculty development planners, in the development and implementation of training pertinent to this topic.

A limitation of the hardware capabilities of the system utilized to implement the multimedia intervention may have impacted upon results. Cognitive flexibility theory, which is the basis for the multimedia intervention, entails the presentation of information in multidimensional ways including text, graphics, pictures, sound, and video. The PC-based laptop computer utilized for the multimedia intervention in this study did not have the capability of sound or video. Although text and graphics were utilized, a more sophisticated system would have the capabilities of presenting information along many more dimensions consistent with the tenets of cognitive flexibility theory.

There is some controversy regarding the effectiveness of one-shot inservice programs in enhancing faculty knowledge or attitudes related to disability issues. The methodology utilized in the current study was a one-time intervention between the pretest and posttest assessments. There was no ongoing delivery of information or contact with subjects, other than the appointment during which one of the two interventions were completed. Future research discussion will address this concern.

Implications for Future Research

The finding that multimedia was not any more effective in enhancing faculty knowledge of disability issues does not minimize its viability as a training tool. This study demonstrated the necessity to evaluate training tools on an ongoing basis to assess their effectiveness in reaching the objectives of the intervention.

It would be interesting to investigate the long-term impact of the two training interventions using a longitudinal or follow-up study. The tenets of cognitive flexibility theory that were incorporated into the multimedia module purport that long-term learning is enhanced. Only a follow-up study can accurately address this issue of retention and long-term learning.

To address the limitation associated with one-shot inservice programs, it would be beneficial to use multimedia and traditional interventions on an ongoing basis and assess their effectiveness over a period of time. Perhaps the interventions could be implemented on a weekly basis throughout a semester. Each weekly module could focus upon a different topical area and could more readily delve into these topics because of the increase in length of the training intervention. Posttest data could be collected at the conclusion of the semester to identify whether there is any difference between repeated interventions of the two modalities and the one-time intervention that characterized this study.

Cost-effectiveness of a training intervention is an important consideration for faculty development planners. In a higher education setting, one determinant of whether a particular tool is cost-effective is based on the benefit that the resource has for as many individuals as possible. Since participants in the multimedia group indicated that they

were very satisfied with the tool to a greater degree than their colleagues in the traditional group, it would be interesting to assess whether they use this tool on an ongoing basis. A particular modality can be cost effective if the initial expense associated with developing the modality is outweighed by the number of times the tool is utilized. If more faculty are willing to use the modality because they are satisfied with it, than the initial cost becomes even more reasonable.

Empirical studies have indicated that multimedia is advantageous for group learning. A natural progression from this current endeavor is to investigate the effectiveness of this modality as a training vehicle in group situations. Multimedia is being used in classrooms to supplement text and lectures. It would be beneficial to investigate the effectiveness of this modality, as compared to a traditional verbal inservice presentation, in a small workshop situation.

The potential for reaching large numbers through multimedia is enormous. Many respondents in the study suggested that the information be presented through the Internet. Although the interactional benefits of individualized instruction would not be realized through the Internet system, a true indicator of the cost-benefit of a training tool is whether faculty would be more apt to use the resource, as opposed to an alternate methodology. If information pertinent to disability issues in higher education were made available through the Internet system, it would be interesting to evaluate faculty members' use of this resource, as opposed to the traditional written materials that are frequently disseminated.

The ultimate assessment of a training modality's effectiveness is an evaluation of how the information acquired by the learner impacts upon instructional practices and

behavior. Future research is recommended that includes students with disabilities in the sample. Students can be asked to rate or describe their interactions with specific professors before and after the professor has completed a training intervention. The dependent variable would not be knowledge scores on a posttest instrument, as was the case in this study, rather the dependent variable would be the data presented by the students regarding their interactions with these professors. The true acquisition of knowledge is the use of this knowledge in realistic situations. The effectiveness of a particular modality would be based upon a subject's application of more positive behaviors in instructional situations involving students with disabilities.

Summary

Individuals learn at different rates and benefit from a varying array of instructional tools. The results of this study substantiate this tenet in that some faculty members learned more using a multimedia training tool, while others enhanced their knowledge using a traditional handbook training intervention. However, this does not minimize the viability of multimedia as a tool in the faculty development process. The high degree of satisfaction reported by study participants who used the modality substantiates its use as an enhancement to existing training tools.

Faculty development planners in higher education settings should use a multiple intervention strategy to reach the diversity of faculty on a college campus. Multimedia can be incorporated into the repertoire of training vehicles available to faculty and can be used to compliment existing methodologies, rather than replace them. Further, the personal contact that was evident in this research was identified by subjects as being a

positive aspect of the training experience. Training methodologies that are characterized by personal contact may be better received by faculty.

It was encouraging to find that 83% of the sample of 42 faculty had experience teaching students with disabilities. Previous empirical studies indicated that prior interactions with students with disabilities positively impact upon knowledge and attitudes thus positively affecting the campus climate. With the increasing enrollment of students with disabilities in higher education, the campus environment, including the knowledge and attitudes expressed by university faculty is crucial to the success of these students. Ongoing development, implementation, and evaluation of training modalities related to faculty training and disability issues is important in facilitating a campus climate that welcomes students with disabilities.

APPENDIX A

FEEDBACK FROM NATIONAL DISABILITY SERVICE PROVIDERS

David Baggitt: (formerly a doctoral student at U of Massachusetts - Amherst - now at Modesto Junior College in California) - 10/4/94

Need for faculty training is ongoing. University of Massachusetts at Amherst is implementing many of the recommendations that emanated from his doctoral research. Amherst is in the preliminary stages of implementing a multimedia training program using authoring software for disability issue training on its campus. No formalized faculty training programs exist at the University.

Trey Duffy: (University of Wisconsin - Madison) - 9/9/94

Inservice programs at the University are directed toward specific departments. Teaching assistants receive a mandatory diversity training course. Training materials at the University of Wisconsin are based on information from AHEAD. Training programs should be based upon the needs of individual faculty. No information was provided regarding the use of multimedia.

Joan Fisher: (Cornell University) - 9/5/94

All 2200 faculty at Cornell receive letters and informational fact sheets regarding students with disabilities. University publishes an array of information regarding disability etiquette, services, and resources. Fisher indicated that university administrators and staff are "hungry for information". She had no knowledge of universities that use multimedia as a training tool.

Richard Harris: (Ball State University) - 9/5/94

Faculty receive training through a faculty handbook - a copy was obtained for review. Dr. Harris suggested that top level administrators be involved in faculty training programs and explained that it was hard to get faculty involved in training, regardless of topic. He attributed this to the time constraints that are placed on faculty time and fear of disability issues. He was not aware of any higher education setting using multimedia as a faculty training tool.

Rhona Hartman: (HEATH - American Council on Education, Washington, DC) - Summer, 94

Need for faculty training exists. There are a lot of universities that use print materials, workshops, and inservice programs. Little information exists regarding the use of multimedia for faculty training.

Warren King: (Ohio State University) - 9/5/94

This university does not have a formal faculty training program. He presented no information regarding the use of multimedia training in higher education settings.

Sue Kroeger: (University of Minnesota) - 9/20/94

University service providers developed a training manual call "Project Outreach". Subsequent contact with Betty Aune, Assistant Director of Grants, indicated that the training was directed toward career development staff. No knowledge of computer based - multimedia training. Written information was received.

Jane Rochester: (University of North Carolina - Charlotte) - 9/5/94

Provider indicated that all faculty receive brochures regarding specific disability groups and the implications for instruction. Training is specific to the needs of a particular department. She will do inservice presentations and workshops as requested. No knowledge of computer based or multimedia training.

Ted Slovin: (University of Massachusetts - Amherst) - 10/6/94

Dr. Slovin is involved in developing an authorware training program regarding disability issues. He is using software, "Voyager Electronic Tool kit", however, since the project is in its early stages, he was unable to provide information regarding the implementation of the training or its' effectiveness.

APPENDIX B
ORIGINAL KNOWLEDGE SURVEY

QUESTIONNAIRE TO ASSESS KNOWLEDGE OF STUDENTS WITH DISABILITIES
IN HIGHER EDUCATION

Aksamit, D., Morris, M., and Leuenberger, J. (1987)
University of Nebraska -- Lincoln

Scale 1-6: *strongly disagree* (1), *disagree* (2), *tend to disagree* (3), *tend to agree* (4), *agree* (5), *strongly agree* (6).

Knowledge sub scale:

- | | | | | | | |
|---|---|---|---|---|---|---|
| 1. Adaptations may not eliminate academic failure. | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. LD often have poor writing and spelling skills. | 1 | 2 | 3 | 4 | 5 | 6 |
| 3. LD have poor study habits which affect academic performance. | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. LD are not irresponsible, but may be disorganized. | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. LD are often poor readers. | 1 | 2 | 3 | 4 | 5 | 6 |
| 6. This university has programs for LD students. | 1 | 2 | 3 | 4 | 5 | 6 |
| 7. LD are protected from discrimination by federal law. | 1 | 2 | 3 | 4 | 5 | 6 |
| 8. I know where to refer LD students. | 1 | 2 | 3 | 4 | 5 | 6 |
| 9. I can recognize LD students. | 1 | 2 | 3 | 4 | 5 | 6 |
| 10. I know when to assist LD students. | 1 | 2 | 3 | 4 | 5 | 6 |
| 11. I know how to offer assistance to LD students. | 1 | 2 | 3 | 4 | 5 | 6 |

APPENDIX C
PRETEST CORRESPONDENCE
DEMOGRAPHIC SURVEY
PRETEST SURVEY
THANK-YOU NOTE
POSTTEST SURVEY

LETTERHEAD

DATE, 1995

NAME, ID#
TITLE, COLLEGE
BLDG
CAMPUS

Dear Dr. NAME:

Your help is needed in a study related to students with disabilities at the University of Florida. Recently, a flyer was mailed to you with an announcement of the research intentions related to enhancing faculty knowledge of students with disabilities on our campus. We are excited about this research topic and hope this intervention will have long lasting benefits for you and for the climate of education for students with disabilities at the University of Florida.

Enclosed please find a survey regarding your knowledge of issues related to students with disabilities at the University of Florida. Please complete this survey and return it in the enclosed envelope within one week. Upon receipt of the completed survey, we will contact you to arrange a convenient appointment. We will bring to this appointment staff development materials related to students with disabilities. We will ask that you complete the staff development module during this appointment time. The entire process should not take more than 25 minutes.

Participation in this study is voluntary and names of participants will not be disclosed at any point in the study. You are invited to participate in any or all of the research process and can contact us at any time with questions or concerns that you have. We would welcome any suggestions that you have and would be happy to provide you with updates and findings as they develop.

Thank you for your participation. We can be reached at the Department of Special Education
at 392-0701 ext. 258.

Sincerely,

Stuart E. Schwartz Ed.D.
Professor

Judy L. Wald
Research Associate

FACULTY QUESTIONNAIRE

Please complete the demographic component of this questionnaire. Your name will not appear on any documentation associated with this research. You do not have to answer any question you do not wish to answer. There will be no compensation associated with your participation.

ID#: _____ (Identified on cover letter)

TITLE: _____

COLLEGE: _____

DEPARTMENT/ADDRESS: _____

TELEPHONE: _____

Circle Responses when Applicable

MALE

FEMALE:

(1)

(2)

COLLEGE: (1) Agriculture (9) Journalism & Communications
(2) Architecture (10) Law
(3) Business Administration (11) Liberal Arts & Sciences
(4) Education (12) Medicine
(5) Engineering (13) Nursing
(6) Fine Arts (14) Pharmacy
(7) Health / Human Performance (15) Veterinary Medicine
(8) Health Related Professions

YEARS OF TEACHING EXPERIENCE IN HIGHER EDUCATION:

1-3 YEARS 4-7 YEARS 8-10 YEARS 11 OR MORE YEARS

(1)

(2)

(3)

(4)

I HAVE EXPERIENCE TEACHING STUDENTS WITH DISABILITIES: YES NO
(1) (2)

ACCESS TO COMPUTER HARDWARE

PC BASED

MACINTOSH BASED

BOTH

NEITHER

(1)

(2)

(3)

(4)

COMMENTS / CONCERNS REGARDING THIS QUESTIONNAIRE:

If you have any questions please call Judy Wald, at the Department of Special Education, 392-0701 ext. 258. When you have completed the questionnaire contained on the following page, return it to Judy Wald, Department of Special Education in the enclosed envelope. Thank you for your participation.

ID#:

COLLEGE & DEPARTMENT:

TELEPHONE NUMBER:

FACULTY QUESTIONNAIRE

Please answer questions by placing an X in the column that coincides with your answer. You do not have to answer any question you do not wish to answer.

QUESTION	<i>strongly disagree (1)</i>	<i>disagree (2)</i>	<i>agree (3)</i>	<i>strongly agree (4)</i>
1. Adaptations may not eliminate academic failure				
2. The University of FL has programs for students with disabilities				
3. Students with disabilities are protected from discrimination by Federal law				
4. I know where to refer students with disabilities				
5. I know when to assist students with disabilities				
6. I know how to offer assistance to students with disabilities				
7. It is possible to change the location of a classroom for a student who uses a wheelchair				
8. Vocal Eyes is a national program for students with visual disabilities				
9. The Visual Aids Reading room provides career guidance				
10. The most important piece of legislation that affects services for students with disabilities at UF is the Rehabilitation Act of 1973				
11. Students with disabilities are expected to meet the same academic standards as their peers				
12. The number of students with learning disabilities has increased dramatically over the past few years				
13. Putting a written examination in an alternate format is considered a reasonable accommodation				
14. Waiving a course requirement is considered a reasonable accommodation				
15. The Americans with Disabilities Act (ADA) is expected to bring about great changes to public universities.				

Thank you for your continued participation in this study.

LETTERHEAD

DATE, 1995

NAME

TITLE

ID#

COLLEGE

Dear Dr. NAME:

Thank you very much for your participation in our study regarding faculty knowledge of students with disabilities. We appreciate the time that you took out of your busy schedule to complete the training module and hope that you found this experience valuable in your daily interactions with students with disabilities on this campus.

In order to assess the effectiveness of the training module that you completed, we ask that you complete the attached questionnaire related to your knowledge of students with disabilities. We have included a questionnaire that enables you to give us feedback regarding the modality you completed. Your name will not be included on any documentation associated with the findings in this research. If you have any questions, please call us at the Department of Special Education, at 392-0701, ext. 258.

Again, thank you for your participation. We would be happy to share the results of this study with you and would welcome any comments that you have pertinent to this research undertaking.

Sincerely,

Stuart E. Schwartz, Ed.D.
Professor

Judy L. Wald
Research Associate

ID#: _____ (Identified on cover letter)

TITLE: _____

COLLEGE & DEPARTMENT: _____

Approximate time that it took you to complete the module: _____

FACULTY QUESTIONNAIRE

Please answer questions by placing an X in the column that coincides with your answer. You do not have to answer any question you do not wish to answer:

QUESTION	<i>strongly disagree (1)</i>	<i>disagree (2)</i>	<i>agree (3)</i>	<i>strongly agree (4)</i>
1. Adaptations may not eliminate academic failure				
2. The University of FL has programs for students with disabilities				
3. Students with disabilities are protected from discrimination by Federal law				
4. I know where to refer students with disabilities				
5. I know when to assist students with disabilities				
6. I know how to offer assistance to students with disabilities				
7. It is possible to change the location of a classroom for a student who uses a wheelchair				
8. Vocal Eyes is a national program for students with visual disabilities				
9. The Visual Aids Reading room is a resource related to career guidance for students with disabilities				
10. The most important piece of legislation that affects services for students with disabilities at UF is the Rehabilitation Act of 1973				
11. Students with disabilities are expected to meet the same academic standards as their peers				
12. The number of students with learning disabilities has increased dramatically over the past few years				
13. Putting a written examination in an alternate format is considered a reasonable accommodation				
14. Waiving a course requirement is considered a reasonable accommodation				
15. The Americans with Disabilities Act (ADA) is expected to bring about great change to public universities.				

How satisfied were you with this modality as a staff development tool?

1	2	3	4
Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

What did you like most about this method of staff development? _____

What did you like least about this method of staff development? _____

Do you believe that this modality has the potential for future applicability as a staff development tool?

1	2	3	4
No potential	Little potential	Some potential	Good potential

What aspects of this method are an effective means of staff development? _____

What aspects of this method are an ineffective means of staff development? _____

Do you feel that if this mode of development were available on this campus that faculty would voluntarily participate in the training exercise? Yes No

Suggestions / Comments: _____

Thank you for your participation in this study.

APPENDIX D

PANEL OF EXPERTS USED IN PILOT STUDY

Jim Costello: Mr. Costello is the current Assistant Dean for Student Services - Programs and Services for Students with Disabilities at the University of Florida. He received his Bachelor's degree in Vocational Rehabilitation from the University of Wisconsin - Stout, in 1976 and his Master's degree in Vocational Rehabilitation from this same university in 1981. Mr. Costello is currently a doctoral candidate at Florida State University with a specialization in Rehabilitation Services.

Don Grossman: Mr. Grossman is the current Coordinator of Assistive Technology at the University of Florida. He completed his undergraduate studies at Indiana State University and received graduate education at the University of Massachusetts, Boston University, and the University of Florida. Mr. Grossman has extensive experience teaching computer technology courses at the community, university, and corporate levels and worked in the corporate sector as a regional manager for a major international computer corporation.

David Houchins: Mr. Houchins is currently a Master's Student in Transition Education in the Department of Special Education, at the University of Florida. He earned a Bachelor's in Special Education from Ball State University in 1986. Mr. Houchins has over nine years of classroom teaching and curriculum development experience. He developed an on-line bulletin board system for countywide educators in his area while working as an educator and hopes to continue his graduate studies at the doctoral level with an emphasis upon computer technology and administration.

Luann Jordan: Dr. Jordan is currently an Instructor in the Department of Special Education at the University of Florida. She completed undergraduate coursework at the College of Albemarle, in Elizabeth City, North Carolina and East Carolina University in Greenville, North Carolina. Dr. Jordan graduated with a Bachelor's of Science degree from East Carolina University in 1983 with a specialization in Mental Retardation and Special Education. She completed her graduate work in 1988 at East Carolina University, with a specialization in Learning Disabilities. Dr. Jordan successfully defended her Doctoral dissertation in January, 1995, and received her Ph.D. in Special Education in May, 1995. She was the recipient of the 1995 Graduate Student Forum award for research in the division of education and has published articles and presented at national conferences in the areas of teacher education and learning strategy interventions.

Ken Osfield: Mr. Osfield is the current Americans with Disabilities Act (ADA) Coordinator at the University of Florida. He received his Bachelor's degree in Education from the University of Rhode Island in 1974, and his Master's degree in Counseling, Human Development, and Families from the University of Rhode Island in 1989. Mr. Osfield held the position of Assistant Dean for Student Services - Programs and Services for Students with Disabilities for five years before assuming his current position as ADA Coordinator for the University of Florida. He serves as the Chair of the Committee on Persons with Disabilities at the University of Florida, which addresses campus wide policy issues related to persons with disabilities. Mr. Osfield has authored several publications pertinent to guides for students with disabilities in higher education institutions in Florida, Section 504 of the Rehabilitation Act, and the implications for universities of the Americans with Disabilities Act.

Elizabeth Wikfors: Ms. Wikfors is currently a doctoral student in the Department of Special Education at the University of Florida. Her specialization areas include special education, family systems, school-family partnerships, and secondary school to work transition. She received a Bachelor's in Elementary Education from George Mason University in Fairfax, Virginia in 1980 and a Master of Education degree from the College of William & Mary in Williamsburg, Virginia in 1991, with a specialization in Special Education, Learning Disabilities, and Resource Consultation Teaching. Ms. Wikfors has published several articles and resources pertinent to family issues and students with disabilities.

APPENDIX E
CONTENT VALIDITY CHECKLIST FOR TRAINING MODULES

TRAINING MODULE CHECKLIST

INSTRUCTIONS: INDICATE WHETHER EACH OF THE TRAINING MODULES COVERS THE TOPIC INDICATED BY PLACING AN X IN THE APPROPRIATE COLUMN -- SWD= students with disabilities.

DOES THE MODULE...	Handbook	Multimedia
Indicate the total number of disability groups represented in higher education?		
Indicate the % of students w/ physical disabilities?		
Indicate the % of students w/ hearing disabilities?		
Indicate the % of students with speech disorders?		
Indicate the % of students w/ learning disabilities?		
Indicate the types of physical disorders?		
Offer instructional suggestions for physical dis?		
Provide a description of students with hearing dis?		
Offer instructional suggestions for hearing dis?		
Provide a description of learning disabilities?		
Offer instructional implication for learning dis?		
Offer information regarding the academic majors in which swd should not be involved?		
Give examples of swd and their academic majors?		
Provide information re; the Rehab Act and its provisions?		
Indicate what the implications of the ADA are for public higher education institutions?		
Explain IDEA and its implications?		
Discuss the questions that need to be posed regarding reasonable accommodations?		
Provide examples of reasonable accommodations?		
Indicate what implications the Voc Tech Act has in higher education?		
Discuss the student/s responsibility for obtaining service?		
Discuss the responsibility of the Office of Programs and Services for SWD?		
Indicate what the ramifications are if the swd should decide not to disclose the fact that they have a disability?		
Discuss the importance of language when referring to swd?		
Explain that Tigert Hall is responsible for services?		
Indicate where to refer a swd?		
Offer information regarding the services offered through student services?		
Explain that services offered through student services includes career counseling and job placement?		

DOES THE MODULE...

Handbook Multimedia

Provide a definition of alternate format?		
Give a description of the Visual Aids Reading Room?		
Give a description of Vocal Eyes?		
Give a description of the internet reading service for swd?		
Offer suggested classroom accommodations related to:		
• priority seating?		
• changing a classroom location?		
• tape recording of lectures?		
• removing a student from class is they have a visual disability?		
• provide students with copies of lecture materials?		
• modifying exams?		
• the use of auxiliary aids?		
Suggest that one should treat a swd differently from other students?		
Suggest that one should treat a swd as you would any other student?		
Provide referral information and telephone numbers?		

Would you like to offer any suggestions or comments regarding either of the training modules? _____

Do you believe that either one of these training modules would be effective? _____

Would you prefer to use one mode of training over the other? Why or why not? _____

APPENDIX F
RELIABILITY CHECKLIST FOR KNOWLEDGE INSTRUMENT

INSTRUMENT / MODALITY REVIEWER CHECKLIST

INSTRUCTIONS: PLEASE PLACE AN X IN THE COLUMN UNDER EACH OF THE MODALITIES IF YOU BELIEVE THE TRAINING MODULE PRESENTS YOU WITH ENOUGH INFORMATION TO ANSWER THE QUESTION.

	Faculty handbook	Multimedia
1. Adaptations may not eliminate academic failure		
2. The University of FL has programs for students with disabilities		
3. Students with disabilities are protected from discrimination by Federal law		
4. I know where to refer students with disabilities		
5. I know when to assist students with disabilities		
6. I know how to offer assistance to students with disabilities		
7. It is possible to change the location of a classroom for a student who uses a wheelchair		
8. Vocal Eyes is a national program for students with visual disabilities		
9. The Visual Aids Reading room provides career guidance		
10. The most important piece of legislation that affects services for students with disabilities at UF is the Rehabilitation Act of 1973		
11. Students with disabilities are expected to meet the same academic standards as their peers		
12. The number of students with learning disabilities has increased dramatically over the past few years		
13. Putting a written examination in an alternate format is considered a reasonable accommodation		
14. Waiving a course requirement is considered a reasonable accommodation		
15. The Americans with Disabilities Act (ADA) is expected to bring about great changes to public universities.		

Comments or suggestions regarding the survey: _____

Any other suggestions or feedback you would like to give regarding the training interventions:

APPENDIX G
HOT NEWS FLYER

HOT NEWS

REPORT OF PENDING RESEARCH

AS A FACULTY MEMBER DO YOU...

- **WANT TO INCREASE YOUR KNOWLEDGE OF STUDENTS WITH DISABILITIES IN YOUR CLASSROOM?**
- **LEARN HOW LEGISLATION IMPACTS UPON STUDENTS WITH DISABILITIES IN HIGHER EDUCATION?**
- **LEARN ABOUT THE RESOURCES AND SERVICES THAT ARE AVAILABLE TO YOU ON OUR CAMPUS?**

THIS IS THE OPPORTUNITY FOR YOU!!!

WE WILL BE CONTACTING YOU IN THE NEAR FUTURE TO INVITE YOU TO PARTICIPATE IN A STUDY DESIGNED TO INCREASE YOUR KNOWLEDGE OF ISSUES RELATED TO STUDENTS WITH DISABILITIES AT THE UNIVERSITY OF FLORIDA. YOUR PARTICIPATION CAN IMPACT UPON YOUR INTERACTION WITH STUDENTS AND CAN POSITIVELY AFFECT YOUR TEACHING INTERVENTION.

TAKE THIS CHALLENGE!!!

THANK YOU IN ADVANCE FOR YOUR PARTICIPATION.

**JUDY WALD / DR. STUART SCHWARTZ
DEPARTMENT OF SPECIAL EDUCATION
392-0701 ext. 258**

APPENDIX H
TIME LINE AND PROCEDURES

TIMELINE OF PROCEDURES

STUDY TO ASSESS THE EFFECTIVENESS OF A MULTIMEDIA TRAINING PROGRAM VERSUS A TRADITIONAL TRAINING PROGRAM

WEEK ONE	WEEK TWO	WEEK THREE	WEEK FIVE	WEEK SIX	WEEK SEVEN
mail flyer to 300 randomly selected UF faculty	initial mailing -introductory letter -demographic sheet -pretest survey	deadline for receipt of completed pretest surveys -begin to schedule appointments for training sessions	appointments for training sessions	appointments for training sessions	appointments for training sessions

APPENDIX I
MATERIALS
DESCRIPTION OF SOFTWARE

MATERIALS

1. Toshiba laptop color computer - multimedia training program installed on hard-drive.
2. Faculty handbook.
3. Posttest survey - blue - traditional (faculty handbook modality)
 green - multimedia modality.
4. Thank-you letters.

DESCRIPTION OF MULTIMEDIA SOFTWARE

Lotus Freelance Graphics was used to develop the multimedia training program. The software has interactive and branching capabilities that allows the user to navigate throughout the presentation or program. Effects can be added to presentation screens to enhance content of presentation. The software can be installed on any IBM-compatible system.

APPENDIX J
FACULTY HANDBOOK

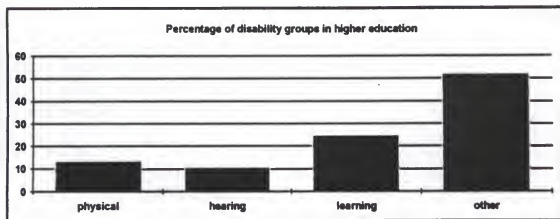
FACULTY GUIDE
TO
STUDENTS WITH DISABILITIES
AT THE
UNIVERSITY OF FLORIDA



SPRING 1995

STUDENTS WITH DISABILITIES ENTERING POSTSECONDARY INSTITUTIONS ON THE RISE...

- In 1978, 2.6 percent of university freshmen reported having a disability. In 1991, 8.8 percent of university freshmen reported a disability. Today, this figure is 10.5 percent.
- Students with physical disabilities represent approximately 13.5% of all student with disabilities on colleges campuses.
- Students with hearing disabilities represent 10.5% of all students with disabilities on college campuses.
- Students with learning disabilities represent 24.9% of all students with disabilities on college campuses.



STUDENTS WITH PHYSICAL DISABILITIES

- Among the most common permanent disabilities are paralysis, amputation, muscular dystrophy, multiple sclerosis and cerebral palsy.
- Instructional implications: ensure that there are no physical obstacles in the classroom that act as a barrier to the students full integration and participation in the class.

STUDENTS WITH HEARING DISABILITIES

- Indications that a student has a hearing loss may include a student's straining to hear, intense concentration on the speaker's face, use of loud or distorted speech, requests to repeat or spell words, and consistent failure to respond. Students who are hard of hearing or deaf may use American Sign Language as their main language or may be able to lip read.
- Instructional implications: ensure that the student has an unobstructed line of vision to the class material being presented.

STUDENTS WITH LEARNING DISABILITIES

- These students have a diverse group of conditions that may cause difficulty in a student's ability to perceive and/or process information. This information can be auditory, visual, and/or spatial information.

- Instructional implications: Each student is an individual and their disability impacts upon their style of learning to varying degrees. It is important that you discuss the ways in which material can be modified to fit the individual learning style of the student.
- Students with disabilities will be in your classroom. Here are some examples:
 - A student who has dyslexia can be a special education major.
 - A student with a visual disability can be a political science major.
 - A student who uses a wheelchair can be a public relations major.

What kind of accommodations can be made for these students?

- The student who has dyslexia can be given additional time on exams and can be given an essay exam versus a multiple choice exam.
- The student who has a visual disability can have all of the course materials placed in alternate format.
- The student who uses a wheelchair can have the class moved to an accessible building.

**THINK ABOUT SOME ACCOMMODATIONS THAT
CAN BE MADE IN YOUR CLASSES...**

DO THESE SEEM REASONABLE?

?????

LEGISLATION....

- the legislation that most directly affects students with disabilities and their access to public higher education institutions is **Section 504 of the Rehabilitation Act of 1973**. The Rehabilitation Act of 1973 affects all public institutions that receive federal funding. Its' provisions include: physical and programmatic access, reasonable accommodations, and accommodations to the instructional process to ensure full educational opportunity for students with disabilities.
- the 1990 **Americans with Disabilities Act (ADA)** affects employment and public access to the University. Because the University of Florida is a public institution, the University is covered by pre-existing legislation in the form of the **Rehabilitation Act of 1973**. Although not many changes are predicted as a result of the ADA, the legislation has heightened awareness of disability and access issues. This fact, is expected to increase the likelihood of disability related legislation.
- the 1990 **Individuals with Disabilities Education Act (IDEA)** provides services to students in the grades K - 12. Because more students with disabilities are receiving services in secondary schools, more students are choosing postsecondary education as a vocational option. These students are expecting services once they reach the institution of higher education since services were commonplace in their earlier educational years.



WHAT IS A REASONABLE ACCOMMODATION?

There is no magical checklist. One should ask whether the modification will fundamentally alter the nature of the program; whether the modification will result in a safety risk to the individual or others; and whether the modification will impose an undue administrative or financial burden on the institution. Each case must be evaluated on an individual basis.

EXAMPLES OF REASONABLE ACCOMMODATIONS...

Problem: A student is a chemistry major who uses a wheelchair. The chair is unable to fit under the lab table because the table is too low.

Solution: The table can be raised with wooden blocks.

Problem: A student has a disability that causes his/her hands to be highly sensitive to the cold. As an agricultural major, this student is expected to spend a great deal of time outdoors.

Solution: The student can be provided with gloves that contain hand-warmers.

Problem: A student is a public relations major and has a voice disability that results in a low speaking voice. The student is required to speak at a public events.

Solution: The student is provided with a hand-held voice amplifying system.



- * Waiving a course requirement is not considered a reasonable accommodation.
- * Although accommodations have been made for a student, that student may still not succeed in your class.

THE RESPONSIBILITY OF STUDENT....

- THE STUDENT HAS A RESPONSIBILITY TO LET FACULTY KNOW THAT THEY HAVE A DISABILITY AND NEED ACCOMMODATIONS IN THE CLASSROOM. THEY CAN DO THIS BY:
- STUDENTS WITH DISABILITIES MAY BRING DOCUMENTATION OF THEIR DISABILITY TO THE OFFICE OF PROGRAMS AND SERVICES FOR STUDENTS WITH DISABILITIES TO PEABODY HALL (P202).
- DEAN JIM COSTELLO WILL NOTIFY EACH OF THE STUDENT'S PROFESSORS THAT THE STUDENT MAY NEED REASONABLE ACCOMMODATIONS. SPECIFIC INFORMATION REGARDING THE NATURE OF THE DISABILITY WILL NOT BE DISCLOSED. THE DEAN FOR STUDENT SERVICES CAN PROVIDE INFORMATION TO FACULTY REGARDING SUGGESTED CLASSROOM MODIFICATIONS.
- IF THE STUDENT CHOOSES NOT TO DISCLOSE THAT THEY HAVE A DISABILITY THE PROFESSOR AND UNIVERSITY ARE UNDER NO OBLIGATION TO PROVIDE REASONABLE ACCOMMODATIONS.
- STUDENTS WITH DISABILITIES HAVE THE SAME ACADEMIC RESPONSIBILITIES AS ALL OTHER STUDENTS. ALTHOUGH ACCOMMODATIONS HAVE BEEN MADE, THIS MAY NOT PRECLUDE THE STUDENT FROM FAILING IN THE ACADEMIC SETTING.

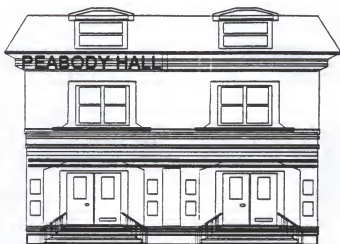
LANGUAGE...

- THE LANGUAGE THAT WE USE TO REFER TO STUDENTS WITH DISABILITIES IS IMPORTANT. PEOPLE WITH DISABILITIES ARE "PEOPLE FIRST" - OUR LANGUAGE SHOULD FOCUS UPON INDIVIDUALITY.

**A professor is discussing the students in his class. He comments,
 "I have a couple of wheelchair bound student, a deaf woman,
 and a couple of blind people."**

THIS WOULD BE AN INCORRECT WAY OF REFERRING TO PERSONS WITH DISABILITIES. THE CORRECT REFERENCE IS: STUDENTS WHO USE WHEELCHAIRS, STUDENTS WITH HEARING DISABILITIES OR STUDENTS WHO ARE DEAF, AND STUDENTS WHO ARE BLIND OR HAVE VISUAL DISABILITIES.

WHERE DO I REFER A STUDENT WITH A DISABILITY?



**THE OFFICE FOR PROGRAMS AND SERVICES FOR
STUDENTS WITH DISABILITIES**

**PEABODY HALL
ROOM 202**

**JIM COSTELLO
ASSISTANT DEAN FOR STUDENT SERVICES
PROGRAMS AND SERVICES FOR STUDENTS WITH
DISABILITIES
392-1261 (Voice)
392-3008 (TDD)**

SERVICES OFFERED:

- PRE-ADMISSION COUNSELING
- PRIORITY REGISTRATION
- LIMITED ACADEMIC ADVISEMENT
- SPECIAL ARRANGEMENTS:
 - Room changes
 - Readers
 - Interpreters
 - Note-takers
 - Tutors

- Professors have an obligation to ensure that all written materials are placed in an alternate format for a student with a visual disability or for a student who has difficulty reading print material.

ALTERNATE FORMAT CAN MEAN:

- ENLARGING WRITTEN ITEMS THROUGH COMPUTERIZED MAGNIFICATION SYSTEMS
 - WRITTEN MATERIALS PLACED ON AUDIOTAPES
 - WRITTEN MATERIALS PLACED IN BRAILLE FORMAT

VISUAL AIDS READING/RESOURCE ROOM (VARR)

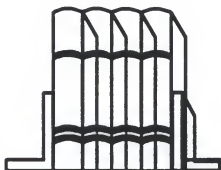
THESE SERVICES CAN BE OBTAINED AT THE VISUAL AIDS READING/RESOURCE ROOM WHICH IS HOUSED IN PEABODY HALL ROOM 202. THIS IS A UNIVERSITY BASED SERVICE THAT HAS COMPUTERIZED EQUIPMENT THAT ENABLES WRITTEN MATERIALS TO BE PLACED IN AN ALTERNATE FORMAT.

FOR MORE INFORMATION REGARDING THE VISUAL AIDS READING/RESOURCE ROOM CONTACT:

DON GROSSMAN:
ADAPTIVE TECHNOLOGY COORDINATOR
 392-1261 (Voice)
 392-3008 (TDD)

VOCAL EYES

THE VOCAL EYES PROGRAM IS A UNIVERSITY PROGRAM THROUGH WHICH VOLUNTEER READERS TRANSLATE WRITTEN TEXTBOOKS INTO AUDIOTAPES FOR STUDENTS WITH VISUAL DISABILITIES AND FOR STUDENTS WHO HAVE DIFFICULTY READING WRITTEN MATERIAL.



*FOR MORE INFORMATION ABOUT THIS UNIVERSITY BASED
SERVICE CONTACT:*

RICK NELSON
DIRECTOR, VOCAL EYES
392-1261 (Voice)
392-3008 (TDD)

HERE ARE SOME SUGGESTED CLASSROOM
ACCOMMODATIONS:

- priority seating in a classroom
- change of classroom location
- tape recording of lectures
- use of note-takers, interpreters, computers
- provide students with copies of lecture materials/transparencies
- modified exam format/alternate evaluation methods
- extra time on assignments/tests
- permit use of auxiliary aids such as calculators/dictionaries

The first step... and most important step in teaching students with disabilities

is to treat students with disabilities as you would any other student.

The similarities of students with disabilities with other students are much more significant than their differences.



**FOR ADDITIONAL INFORMATION REGARDING THIS
TRAINING MODULE PLEASE CALL:**

**JUDY L. WALD
DEPARTMENT OF SPECIAL EDUCATION
392-0701, EXT. 258**

**FOR QUESTIONS REGARDING INSTRUCTIONAL
ACCOMMODATIONS AND STUDENTS WITH
DISABILITIES IN YOUR CLASSES PLEASE CALL:**

**DEAN JIM COSTELLO
392-1261**

**FOR QUESTIONS REGARDING THE AMERICANS WITH
DISABILITIES ACT PLEASE CALL:
KEN OSFIELD-ADA COORDINATOR - 392-7056**

APPENDIX K
EXAMPLE OF GRAPHICS FROM MULTIMEDIA INTERVENTION

A professor teaches a class in a campus building that is inaccessible to students who use wheelchairs. The professor learns that a student who does use a wheelchair will be enrolled in the class next semester.

What does the professor do?

- A. There is nothing that can be done. A lawsuit is imminent.**
- B. Advise to student to hold off from taking the course this semester and perhaps it will be offered in an accessible location next semester.**
- C. Contact the Office for Student Services to inquire about moving the class to an accessible location.**

Sorry, this answer is incorrect. This would not be considered a reasonable accommodation under Section 504 of the Rehabilitation Act or the Americans with Disabilities Act (ADA).



Correct Answer

Next Topic



Excellent. This is the correct answer. Both the Section 504 of the Rehabilitation Act and the Americans with Disabilities Act (ADA) mandate that reasonable accommodations be made.

Next topic

What is a reasonable accommodation

There is no magical definition of what is a reasonable accommodation. One should ask whether the modification will:

- fundamentally alter the nature of the course?
- will not result in a safety risk to the student or others?
- will not impose an undue administrative or financial burden on the institution?
 - Professors are not expected to lower academic standards or waive course requirements without substitution.

Each case must be evaluated on an individual basis.

Next topic

REFERENCES

- Aksamit, D., Morris, M., & Leuenberger, J. (1987). Preparation of student services professionals and faculty for servicing learning disabled college students. Journal of College Student Personnel, 28, 53-59.
- Anna, K. (1989). Attitudes of the University of Virginia faculty and administrators toward disabled college students. (Doctoral Dissertation, University of Virginia, 1989) Dissertation Abstracts International, 50(10), 3166-A.
- Babbie, E. (1990). Survey research methods (2nd ed.). Belmont, California: Wadsworth.
- Baggett, D. W. (1993). Study of the University of Massachusetts at Amherst faculty's knowledge of disabilities, experience with education students with disabilities, and attitudes that faculty possess towards students with disabilities. (Doctoral Dissertation, University of Massachusetts, 1993) Dissertation Abstracts International, 54, DFA9329561.
- Bain, A. Houghton, S., Sah, F. B. & Carroll, A. (1992). An evaluation of the application of interactive video for teaching social problem-solving to early adolescents. Journal of Computer-Based Instruction, 19, 92-99.
- Barr, M. J. (1978). Self-paced and videotaped training interventions. In U. Delworth (Ed.), Training competent staff: New directions for student services, (2), (pp. 37-51). San Francisco: Jossey-Bass.
- Beer, J. & Freifeld, K. (1992). Super tutorials. PC World, 10, 192-194.
- Beirne-Smith, M. & Deck, M.D. (1989). A survey of postsecondary programs for student with learning disabilities. Journal of Learning Disabilities, 22, 456-457.
- Billings, D.M. & Cobb, K.L. (1992). Effects of learning style preferences, attitude and GPA on learner achievement using computer assisted interactive videodisc instruction. Journal of Computer-Based Instruction, 19, 12-16.
- Borg, W. R. & Gall, M. D. (1989). Educational research. New York: Longman.
- Bradley, M. K., Kallick, B. O., & Regan, H. B. (1991). The staff development manager: A guide to professional growth. Boston: Allyn and Bacon.

- Bransford, J.D. & Vye, N.J. (1989). A perspective on cognitive research and its implications for instruction. In L. B. Resnick & L. E. Klopfer (Eds.), Toward the thinking curriculum: Current cognitive research (pp. 173-106). Alexandria, VA: Association for Supervision and Curriculum Development.
- Bursuck, W. D. & Rose, E. (1992). Community college options for students with mild disabilities. In F. R. Rusch, L. Destefano, J. Chadsey-Rusch, L. Allen Phelps, & E. Szymanski (Eds.), Transition from school to adult life: Models, linkages, and policy (pp. 71-91). Sycamore, IL: Sycamore.
- Cowles, M. & Davis, C. (1982). On the origins of the .05 level of statistical significance. American Psychologist, 37, 553-558.
- Cronin, M. & Cronin, K. A. (1992). A critical analysis of the theoretic foundations of interactive video instruction. Journal of Computer-Based Instruction, 19, 37-41.
- Dalke, C. L. (1991). Support programs in higher education for students with disabilities: Access for all. Gaithersburg, MD: Aspen.
- Dalke, C. L. (1993). Making a successful transition from high school to college: A model program. In S. A. Vogel & P. B. Adelman (Eds.), Success for college students with learning disabilities (pp. 57-79). New York: Springer-Verlag.
- Day, C. W. (1993). The multimedia difference. American School & University, 60,(2),26.
- Delworth, U. & Yarris, E. (1978). Concepts and processes for the new training role. In U. Delworth (Ed.), Training competent staff: New directions for student services (2), (pp. 1-15). San Francisco: Jossey-Bass.
- DeStefano, L. & Wermuth, T. (1992). IDEA (P.L. 101-476): Defining a second generation of transition services. In F. R. Rusch, L. DeStefano, J. Chadsey-Rusch, L. Allen Phelps, & E. Szymanski (Eds.), Transition from school to adult life: Models, linkages, and policy (pp. 537-549). Sycamore, IL: Sycamore.
- Edwards, P. (1992). A study of critical incidents affecting the success of learning-disabled students in higher education (Doctoral dissertation, Lehigh University, 1992). Dissertation Abstracts International, 52, 4235-A.
- Eichinger, J., Rizzo, T., & Sirotnik, B. (1991). Changing attitudes toward people with disabilities. Teacher Education and Special Education, 14, 121-126.
- Eisner, J. & Carter, T. (1989). University faculty teaching activities in an electronic curriculum. Educational Technology, 24,(4), 17-22.

- Fairweather, J. S. & Shaver, D. M. (1990). A troubled future? Participation in postsecondary education by youths with disabilities. Journal of Higher Education, 61, 332-348.
- Farrell, M. L. & Harckham, L. D. (1988). Attitude of college personnel toward learning disabled college students. Journal of Postsecondary Education and Disability, 6, 7-11.
- Fichten, C. S., Goodrick, G., Tagalakis, V., Amsel, R., & Libman, E. (1990). Getting along in college: Recommendations for college students with disabilities and their professors. Rehabilitation Counseling Bulletin, 34, 103-125.
- Focus on Faculty. (1987, Fall). Information from Heath, 6(3), 1-2, 6.
- Fonosch, G. G. & Schwab, L. O. (1981). Attitudes of selected university faculty members toward disabled students. Journal of College Student Personnel, 22, 229-235.
- Frank, K. & Wade, P. (1993). Disabled student services in postsecondary education: Who's responsible for what? Journal of College Student Development, 34, 26-30.
- Gajar, A. H. (1992). University-based models for students with learning disabilities: The Pennsylvania State University model. In F.R. Rusch, L. Destefano, J. Chadsey-Rusch, L. Allen Phelps, & E. Szymanski (Eds.), Transition from school to adult life: Models, linkages, and policy (pp. 51-70). Sycamore, IL: Sycamore.
- Gajar, A. H., Goodman, L., & McAfee, J. (1993). Secondary schools and beyond: Transition of Individuals with Mild Disabilities. New York: Macmillan.
- Goldman, E. & Barron, L. (1990). Using hypermedia to improve the preparation of elementary teachers. Journal of Teacher Education, 41, 21-31.
- Harris, B. M. (1989). In-service education for staff development. Boston: Allyn & Bacon.
- Horowitz, D. (1994). University students with disabilities: Needs and services. Unpublished master's thesis, University of Florida, Gainesville.
- Houck, C. K., Asselin, S. B., Troutman, G. C., & Arrington, J. M. (1992). Students with learning disabilities in the university environment: A study of faculty and student perceptions. Journal of Learning Disabilities, 24, 678-684.
- Jacobson, R. L. (1993, May 5). As instructional technology proliferates, skeptics seek hard evidence of its value. The Chronicle of Higher Education, pp. A27-A29.

- Jacobson, M. J., & Spiro, R. J. (1993). Hypertext learning environments, cognitive flexibility, and the transfer of complex knowledge: An empirical investigation. (Report No. 573). Champaign, IL: Center for the Study of Reading, University of Illinois. (ERIC Document Reproduction Service No. ED 355 508).
- Jarrow, J. (1991). Disability issues on campus and the road to ADA. Educational Record, 72(1), 26-31.
- Jarrow, J. (1993). Beyond ramps: New ways of viewing access. In S. Kroeger & J. Schuck (Eds.), Responding to disability issues in student affairs (pp. 5-17). San Francisco: Jossey-Bass.
- Jaschik, S. (1994, April 20). Colleges and the disabled. Chronicle of Higher Education, pp. A38-A39.
- Keller, J. M. & Kopp, T. W. (1987). An application of the ARCS model of motivational design. In C. M. Reigeluth (Ed.), Instructional theories in action: Lessons illustrating selected theories and models (pp. 289-320). Hillsdale, NJ: Lawrence Erlbaum.
- Kincer, K. K. (1991). Factors that influence adjustment to postsecondary institutions as perceived by students with learning disabilities (Doctoral dissertation, Virginia Polytechnic Institutes and State University, 1991). Dissertation Abstracts International, 52, 1287-A.
- Knight, H. V., Acosta, L. J., & Anderson, B. D. (1988). A comparison of textbook and microcomputer instruction in preparation for the ACT. Journal of Computer Based Instruction, 15, 83-87.
- Kroeger, S. & Schuck, J. (1993). Responding to disability issues in student affairs: New directions for student services, 64. San Francisco: Jossey-Bass.
- Lanza, A. & Roselli, T. (1991). Effects of the hypertextual approach versus the structured approach on student's achievement. Journal of Computer-Based Instruction, 18, 48-50.
- Larkin, J. H. & Chabay, R. W. (1989). Research on teaching scientific thinking: Implications for computer-based instruction. In L. B. Resnick & L. E. Klopfer (Eds.), Toward the thinking curriculum: Current cognitive research (pp. 150-172). Alexandria, VA: Association for Supervision and Curriculum Development.
- Larsen, R. E. (1992). Relationship of learning style to the effectiveness and acceptance of interactive video instruction. Journal of Computer-Based Instruction, 19, 17-21.
- Lennon, J. & Maurer, H. (1994). Lecturing technology: A future with hypermedia. Educational Technology, 34(4), 5-14.

- Levin, S. R. (1991). The effects of interactive video enhance earthquake lessons on achievement of seventh grade earth science students. Journal of Computer-Based Instruction, 18, 125-129.
- Leyser, Y. (1989). A survey of faculty attitudes and accommodations for students with disabilities. Journal of Postsecondary Education and Disability, 7, 97-108.
- Marion, P. B. & Iovacchini, E. V. (1983). Services for handicapped students in higher education: An analysis of national trends. Journal of College Student Personnel, 24, 131-138.
- McAfee, J. K. & Sheeler, M. C. (1987). Accommodation of adults who are mentally retarded in community colleges: A national study. Education and Training in Mental Retardation, 22, 262-267.
- McCarthy, M. & Campbell, N. J. (1993). Serving disabled students: Faculty needs and attitudes. NASPA Journal, 30, 120-125.
- Merseeth, K. K. & Lacey, C. A. (1993). Weaving stronger fabric: The pedagogical promise of hypermedia and case methods in teacher education. Teacher & Teacher Education, 9, 283-299.
- Milheim, W. D. & Martin, B. (1991). Theoretical bases for the use of learner control: Three different perspectives. Journal of Computer Based Instruction, 18, 99-105.
- Milne, N. V. (1989). The experiences of college students with learning disabilities (Doctoral dissertation, Indiana University, 1989). Dissertation Abstracts International, 51, 2284A.
- Morgan, B. E. & Weckmueller, B. L. (1991). Staff development for the 1990's. College & University, 67, 81-88.
- Morris, M., Leuenberger, J., & Aksamit, D. (1987). Faculty inservice training: Impact on the postsecondary climate for learning disabled students. Journal of Postsecondary Education and Disability, 5, 57-66.
- Nelson, J.R., Dodd, J.M., & Smith, D.J. (1990). Faculty willingness to accommodate students with learning disabilities: A comparison among academic divisions. Journal of Learning Disabilities, 23, 185-189.
- Nelson, R. & Lignugaris/Kraft, B. (1989). Postsecondary education for students with learning disabilities. Exceptional Children, 56, 246-265.
- Newmann, F. M. & Wehlage, G. C. (1993). Five standards of authentic instruction. Educational Leadership, 50(7), 8-12.

- News and Public Affairs Department. (1993). University of Florida campus directory 1993-94. Gainesville, FL: Author.
- Norlander, K. A., Shaw, S. F., & McGuire, J. M. (1990). Competencies of postsecondary education personnel serving students with disabilities. Journal of Learning Disabilities, 23, 86-94.
- Office of Academic Affairs. (1994, March). University of Florida Fact Book. Gainesville, FL: Author.
- Osfield, K. (1993). State University System of Florida resource guide to programs and services for students with disabilities. Tallahassee: State University System of Florida.
- Peck, K. L. & Dorricott, D. (1994). Why use technology? Educational Leadership, 51(7), 11-14.
- Pedhazur, E. J. & Schmelkin, L. P. (1991). Measurement, design, and analysis: An integrated approach. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Percent of college freshmen with disabilities increases. (1992, September-October). Information from Heath, 11(2&3), 1.
- Putnam, M. L. (1984). Postsecondary education for learning-disabled students: A review of the literature. Journal of College Student Personnel, 25, 68-75.
- Quade, A. M. (1993). An assessment of the effectiveness of a hypertext instructional delivery system when compared to a traditional CAI tutorial. Paper presented at the annual convention of the Association for Education Communications and Technology, Division of Research and Theory, New Orleans, LA. (ERIC Document Reproduction Service No. ED362195).
- Rose, E. (1993). Faculty development: Changing attitudes and enhancing knowledge about learning disabilities. In S. A. Vogel & P. B. Adelman, Success for college students with learning disabilities (pp. 131-150). New York: Springer-Verlag.
- Rothstein, L. (1991a, September 4). Campuses and the disabled. Chronicle of Higher Education, pp. B3, B10.
- Rothstein, L. (1991b). Students, staff and faculty with disabilities: Current issues for colleges and universities. Journal of College and University Law, 17, 471-482.
- Salend, S. J., Salend, S. M., & Yanok, J. (1985). Learning disabled students in higher education. Teacher Education and Special Education, 8, 48-54.

- Satcher, J. (1992a). College students with learning disabilities: Meeting the challenge. College & University, 67, 127-131.
- Satcher, J. (1992b). Community college faculty comfort with providing accommodations for students with learning disabilities. College Student Journal, 26, 518-524.
- Sawyer, T. A. (1988). The effects of computerized and conventional study guides on achievement in college students. Journal of Computer-Based Instruction, 15, 80-82.
- Schoen, E., Uysal, M. & McDonald, C. D. (1987). Attitudes of faculty members towards treatment of disabled students reexamined. College Student Journal, 21, 190-194.
- Schuck, J. & Kroeger, S. (1993). Essential elements in effective service delivery. In S. Kroeger & J. Schuck (Eds.), Responding to disability issues in student affairs: New directions for student services, 64 (pp. 59-68). San Francisco: Jossey-Bass.
- Schumacker, R. E. & Hossain, P. G. (1990). Computer use in education: Faculty perception and use of a computer learning center. Journal of Computer-Based Instruction, 17, 87-90.
- Shavelson, R. J. (1988). Statistical reasoning for the behavioral sciences. Boston: Allyn & Bacon.
- Shaw, S. F. & Norlander, K. A. (1986). The special educator's role in training personnel to provide assistance to college students with learning disabilities. Teacher Education and Special Education, 9, 77-81.
- Shea, C. (1994, September 7). Invisible maladies. The Chronicle of Higher Education, pp. A53, A55.
- Smith, D. J. & Nelson, J. R. (1993, April). Factors that influence the success of college student with disabilities. Paper presented at the meeting of the Annual Council for Exceptional Children, San Antonio, Texas (ERIC Document Reproduction Service No. ED363038).
- Smith, P.E. (1989). Some learning and instructional theory considerations for the development of computer related instructional materials. Educational Technology, 29 (11), 18-19.
- Spiro, R. J. & Jehng, J. C. (1990). Cognitive flexibility and hypertext: Theory and technology for the nonlinear and multidimensional traversal of complex subject matter. In D. Nix & R. Spiro (Eds.), Cognition, education and multimedia (pp. 163-205). Hillsdale, NJ: Lawrence Erlbaum Associates.

- Steinberg, E. R. (1989). Cognition and learner control: A literature review, 1977-1988. Journal of Computer-Based Instruction, 16, 117-121.
- Tripp, S. D. & Roby, W. (1990). Orientation and disorientation in a hypertext lexicon. Journal of Computer-Based Instruction, 17, 120-124.
- van den Berg, S. & Watt, J. H. (1991). Effects of educational setting on student responses to structured hypertext. Journal of Computer-Based Instruction, 18, 118-124.
- Vogel, S. A. (1982). On developing LD college programs. Journal of Learning Disabilities, 15, 518-527.
- Vogel, S. A. (1993). The continuum of university responses to section 504 for students with learning disabilities. In S.A. Vogel & P.B. Adelman (Eds.). Success for college students with learning disabilities (pp. 83-113). New York: Springer-Verlag.
- Walker, M. L. (1980). The role of faculty in working with handicapped students. In H. Z. Sprandel, & M. R. Schmidt (Eds.), Serving handicapped students: New directions for student services, 10 (pp. 53-62). San Francisco: Jossey-Bass.
- West, M., Kregel, J., Getzel, E., Zhu, M., Ipsen, S. M., & Martin, E. D. (1993). Beyond section 504: Satisfaction and empowerment of students with disabilities in higher education. Exceptional Children, 59, 456-467.
- Winn, W. (1993). Instructional design and situated learning: Paradox or partners? Educational Technology, 23(3), 16-20.
- Woods, P. A., Sedlacek, W. E., & Boyer, S. P. (1990). Learning disability programs in large universities. NASPA Journal, 27, 248-256.

BIOGRAPHICAL SKETCH

Judy Wald was born on August 31, 1959. She grew up in Westchester County, New York, approximately 40 miles North of Manhattan. Judy's father was a pharmacist, her mother, a registered nurse. Consequently, she was introduced to health related professions and special populations at an early age.

Judy began her undergraduate studies in 1977 at Syracuse University. She graduated with a bachelor's degree in psychology in December 1979. Judy's enjoyment of academic pursuits facilitated her enrollment in the Master of Science program in rehabilitation counseling at Syracuse University. During her graduate program she completed practicum and internship experiences at a Syracuse-based acute care psychiatric hospital, a geriatric facility, and a Veterans Administration Day Treatment program. During her field experiences, Judy was involved in counseling targeted populations, vocational skill development, and vocational placement activities. She developed and implemented curriculums pertinent to vocational and social skills and managed client caseloads. Judy graduated from Syracuse University and obtained a Master of Science degree in June 1982.

In Westchester County, New York, Judy worked as a rehabilitation counselor at a sheltered employment setting affiliated with United Cerebral Palsy (UCP). She worked at UCP for approximately 1 year and moved on to Westchester Association for Retarded Citizens (WARC) to advance her career in rehabilitation counseling. During her 2-year employment with WARC, Judy developed and implemented vocational skill development

curriculums and facilitated job placement activities both in sheltered and competitive settings.

Judy left WARC in 1986 to relocate to the State of Florida to be close to her parents, who had retired. She procured a position with Conservco, a private rehabilitation company and a subsidiary of Travelers Insurance Company. During her 3-year employment as a rehabilitation consultant with Conservco, Judy completed vocational assessments, labor market surveys, vocational skill development activities, employer education, and placement. She served as a vocational expert in Florida's workers compensation hearing system. She complemented her national certification in rehabilitation counseling with a national certification as an insurance rehabilitation specialist.

Sensing that the climate of the private rehabilitation and workers compensation systems in Florida were becoming more adversarial, Judy decided to complement her practical vocational experience with academic pursuits in business. She returned to Syracuse University in New York and entered the Master of Business Administration (M.B.A.) program. Judy concentrated in human resource management and completed an internship in management development and training at International Business Machines' (IBM) research division headquarters in Yorktown Heights, New York. Judy graduated from the M.B.A. program at Syracuse University in May 1991, and entered the highly competitive job market.

In November 1991, Judy's mother necessitated hospitalization at Shands Hospital, affiliated with the University of Florida. Judy traveled to Florida with her father and remained in Gainesville for approximately two months during her mother's recuperation.

Throughout this time, Judy's interest in academics and her enthusiasm for learning brought her to the College of Education at the University of Florida.

Judy's interest in transition services was sparked subsequent to an initial interview with Dr. Stuart Schwartz, Professor in the Department of Special Education. The Leaders in Transition Education program (Project LITE) appeared commensurate with Judy's interest in vocational services and administration and enabled her to utilize her academic and professional experience. She enrolled in the 3-year doctoral program in August 1992.

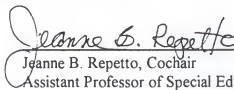
Judy's interest in professional development and life-long learning was realized through her election as the national student representative for the Division on Career Development & Transition (DCDT). She received the State of Florida, Student of the Year Award in February 1995 and was active in student recruitment and conference planning throughout her tenure as student representative.

An internship at the President's Committee on the Employment of People with Disabilities in Washington, DC, reinforced her interest in advocacy and policy regarding people with disabilities. This experience enhanced Judy's belief that education and life-long learning are integral to personal satisfaction and well being.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


Stuart E. Schwartz, Chair
Professor of Special Education

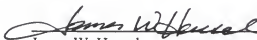
I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


Jeanne B. Repetto, Cochair
Assistant Professor of Special Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


Cary L. Reichard
Professor of Special Education

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

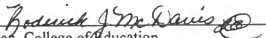

James W. Hensel
Professor of Educational Leadership

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.


Arthur Sandeen
Professor of Educational Leadership

This dissertation was submitted to the Graduate Faculty of the College of Education and the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

August 1995



Dean, College of Education

Dean, Graduate School